President
REPUBLIC OF THE MARSHALL ISLANDS

PETITION
PRESENTED TO THE CONGRESS OF THE UNITED STATES OF AMERICA REGARDING CHANGED CIRCUMSTANCES ARISING FROM U.S. NUCLEAR TESTING IN THE MARSHALL ISLANDS

THE PRESIDENT OF THE UNITED STATES SENATE
AND
THE SPEAKER OF THE UNITED STATES HOUSE OF REPRESENTATIVES

Submitted by
THE GOVERNMENT OF THE REPUBLIC OF THE MARSHALL ISLANDS (RMI)
PURSUANT TO ARTICLE IX OF THE NUCLEAR CLAIMS SETTLEMENT APPROVED BY CONGRESS IN PUBLIC LAW 99-239

September 11, 2000

As provided by Congress in Article IX of the nuclear test claims settlement enacted in law under Title II, Section 177(c) of the Compact of Free Association Act of 1985 [P.L. 99-239], the Republic of the Marshall Islands respectfully submits this Changed Circumstances Petition to the Congress of the United States. The Government of the Republic of the Marshall Islands hereby notifies the Congress of its determination that the criteria have been satisfied under applicable U.S. federal law for further measures to provide adequately for injuries to persons and property in the Marshall Islands that have arisen, been discovered, or adjudicated since the Compact took effect on October 21, 1986.

Section 177 of the Compact of Free Association provides that "The Government of the United States accepts the responsibility for compensation owing to citizens of the Marshall Islands...for loss or damage to property and person...resulting from the nuclear testing program which the Government of the United States conducted in the Northern Marshall Islands between June 30, 1946, and August 18, 1958."

ATTACHMENT III: LEGAL ANALYSIS

Background and History of Claims Court Cases and Impact on Changed Circumstances

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ATTACHMENT III: LEGAL ANALYSIS

BACKGROUND AND HISTORY OF CLAIMS COURT CASES AND IMPACT ON CHANGED CIRCUMSTANCES DEBATE

August 23, 2000

The purpose of this memorandum is to determine how the affected atolls and the RMI government, collectively or individually, can use issues raised in the U.S. Claims Court litigation from the 1980s in the upcoming changed circumstances effort.

1. Description Of Cases

During the 1980s, fourteen lawsuits were filed in the U.S. Claims Court by Marshall Islanders seeking compensation from the U.S. nuclear testing program. The cases involved three different groups of Marshall Islanders: the people of Bikini (Tomaki Juda, et al. v. United States, Docket No. 172-81L), the people of Enewetak Atoll (Johannes Peter, et al. v. United States, Docket No. 461-82L), and the peoples of other Northern Marshall atolls and islands directly downwind from the test sites (twelve cases consolidated for pre-trial preparations under the lead case Limojwa Nitol, et al. v. United States, Docket No. 453-81L).

The three cases were suspended for more than a year "in order to avoid interference with the [Micronesian political status] negotiations, and to permit the parties to explore diplomatic resolution of the claims." Juda v. United States, 6 Cl. Ct. 441, 445 (Cl. Ct. 1984). The Claims Court terminated these suspensions in 1983, rejecting the U.S. government's position and noting that the "impact on foreign policy [of permitting these cases to proceed] is not clear, and at best is very indirect." As Judge Kenneth Harkins noted at the April 13, 1983 oral argument, these claims were "money claims which are the grist of the judicial mills, particularly the function of this court."

Judge Harkins denied U.S. government motions to dismiss in all three cases. In the Juda (Bikini) case, he held that the people of Bikini had stated valid claims under the Court's jurisdictional law (the Tucker Act), 28 U.S.C. § 1491(a)(1), both for takings in violation of the Fifth Amendment and for breach of an implied-in-fact contract that created fiduciary obligations running from the U.S. government to the people of Bikini. The Court also held that the Bikinians' claims were not barred by the sovereign immunity of the United States or by the statute of limitations. Juda v. United States, 6 Cl. Ct. 441 (1984).

In the Peter (Enewetak) case, Judge Harkins held that the complaint stated a claim under the Tucker Act for the breach of implied-in-fact contract, but that the statute of limitations barred the taking claims of the Enewetak people. Peter v. United States, 6 Cl. Ct. 768 (1984). In the Nitol cases, the Court ruled that the complaints stated claims for unlawful takings under the Tucker Act. Nitol v. United States, 7 Cl. Ct. 405 (1985).

After the Compact of Free Association went into effect, the United States filed new motions to dismiss on the grounds that the claims were non-justiciable because they involved political questions and that Articles X and XII of the Compact Section 177 Agreement divested the Claims Court of jurisdiction over these claims. On November 10, 1987, the Claims Court dismissed the Juda (Bikini) case on the ground that Article XII of the 177 Agreement necessarily amends the Tucker Act, thus withdrawing the U.S. government's consent to be sued for plaintiffs' claims arising out of the U.S. nuclear testing program. Juda v. United States, 13 Cl. Ct. 667 (1987). Similar orders were filed in the Peter (Enewetak) case (18 Cl. Ct. 691 (1987)) and the Nitol cases (13 Cl. Ct. 690 (1987)).

Appeal of the 1987 Claims Court decisions were brought by the Peter and Nitol plaintiffs. See People of Enewetak, Rongelap, and other Marshall Islands Atolls v. United States, 864 F. 2d 134 (Fed. Cir. 1988). The people of Bikini also appealed their Claims Court decision, but during the pendency of the appeal in the Federal Circuit, they voluntarily dismissed the Juda case as part of a $90 million settlement with the United States.

2. Political Status Negotiations

As negotiations regarding the future political relationship between Micronesia and the United States progressed, the Trust Territory fragmented politically into four separate entities: the Northern Mariana Islands, Palau, the Marshall Islands, and the Federated States of Micronesia.

The Northern Mariana Islands attained commonwealth status in 1976, and the remaining three entities separately negotiated new political relationships with the United States. All three initialed Compacts of Free Association in October and November 1980, before the Claims Court cases were filed. At that time, the terms of Section 177 of the Compact had been negotiated, but not the separate Section 177 Agreement referred to in Section 177(b) of the Compact.

The Marshall Islands did not achieve free association for another five years, well after the cases were filed. The Reagan Administration delayed negotiations for nearly year as it conducted a comprehensive policy review from 1981 – 1982 (see page 1, above), and the negotiation of the Section 177 Agreement consumed additional time. The final version of the Compact with the Marshall Islands was signed on June 25, 1983, and Marshallese voters approved it in a plebiscite that September. President Reagan submitted the Compact and its subsidiary agreements first to the 98th Congress on March 30, 1984, and again to the 99th Congress after the 98th Congress failed to act. After making extensive modifications, the House and Senate approved the final version in December 1985, and President Reagan signed it into law on January 14, 1986 as the Compact of Free Association Act, Public Law No. 99-239. By proclamation dated November 3, 1986, the President declared the Compact to be in effect.

3. Section 177 Agreement

Article X, Section 1 of the Section 177 Agreement, entitled "Espousal," was designed to extinguish the Claims Court cases by providing that the 177 Agreement

> constitutes the full settlement of all claims, past, present and future, of the Government, citizens and nationals of the Marshall Islands which are based upon, arise out of, or are in any way related to the Nuclear Testing Program, . . . including any of those claims which may be pending . . . in any court . . . of the United States . . . .

Article XII of the Agreement goes on to state:

> All claims described in Articles X and XII of this Agreement shall be terminated. No court of the United States shall have jurisdiction to entertain such

> claims, and any such claims pending in the courts of the United States shall be dismissed.

In the event that these two Articles proved ineffective to terminate the Claims Court cases, Article XI of the Agreement provides that the Marshall Islands shall indemnify and hold harmless the United States for any liability it may incur on Article X claims, up to $150 million.

4. <u>Language Added Under Compact Of Free Association Act</u>

Although the Compact of Free Association Act incorporates the Section 177 Agreement by reference, the language of the statute and its legislative history seemed to modify the effect of these provisions. Section 103(g)(1) of the Act reiterates the "intention" to achieve a "full and final settlement of all claims," while Section 103(g)(2) conditioned the jurisdictional withdrawal in Article XII on the validity of Article X. This subsection states that it is the "explicit understanding and intent of Congress" that Article XII:

- is "enacted solely and exclusively to accomplish the objective of Article X;"
- is "only . . . a clarification of the effect of Article X;" and
- is "not to be construed or implemented separately from Article X."

Plaintiffs in the Claims Court argued that this language showed that Congress' approval of the Section 177 Agreement was qualified. If, as Congress thought possible, the espousal provision would be found invalid under international law, the courts would continue to have jurisdiction over plaintiffs' claim, and the United States would be indemnified under Article XI for any judgment against it, up to $150 million.

The legislative history confirmed this intention. Representative John Seiberling (D – OH), Chairman of the responsible subcommittee and floor manager of the bill, stated in reporting the bill that Section 103(g)(2) was

> intended to make it clear that *court-stripping provisions of Article XII of the Section 177 Agreement have no independent force or effect and their sole function is to implement the provisions of Article X.* Thus, if Article X is invalid, claims covered by the espousal provisions will remain justiciable in U.S. courts, regardless of Article XII.

131 <u>Cong. Rec.</u> H11829 (Dec. 11, 1985). (Emphasis added.)

Nevertheless, the Claims Court construed Article XII to preclude all judicial consideration of the plaintiffs' claims regardless of the validity of the espousal. The Supreme Court has held that only "'clear and convincing' evidence of congressional intent" will permit the interpretation of a jurisdictional statute so as to eliminate any possibility of judicial review of constitutional claims. Johnson v. Robison, 415 U.S. 361, 373-374 (1974) (quoting Abbott Laboratories v. Gardner, 387 U.S. 136, 141 (1967)). However, the Claims Court denied jurisdiction although both the Compact Act and the legislative history seemed to provide "clear and convincing" evidence that Congress intended not to bar judicial consideration of plaintiffs' claims if the espousal were invalid. See Juda v. United States, 13 Cl. Ct. at 683-685.

5. Preclusion Of Judicial Review

In attacking the Section 177 Agreement, plaintiffs in the Claims Court cases argued that its provisions would be unconstitutional by foreclosing all judicial consideration of plaintiffs' taking claims without providing an alternative remedy. Plaintiffs argued that their Fifth Amendment claims merited special protection even in relation to other Constitutional claims, because the Fifth Amendment guarantees both a right to just compensation and a remedy to obtain it. First English Evangelical Lutheran Church v. County of Los Angeles, 482 U.S. 304, 315-316 and n. 9 (1987).

Plaintiffs also argued that Congress could not accomplish the same result – extinguishing their claims – indirectly by withdrawing jurisdiction or consent to sue. Both the courts and Constitutional scholars agree that Congress cannot exercise its jurisdiction so as to deprive any person of his Constitutional rights. See, e.g., United States v. Klein, 80 U.S. (13 Wall.) 128 (1871); Battaglia v. General Motors Corp., 169 F. 2d 254 (2nd Cir.), cert. denied, 355 U.S. 887. See also Gunther, "Congressional Power to Curtail Federal Court Jurisdiction: An Opinionated Guide to the Ongoing Debate," 36 Stan. L. Rev. 895, 921 n.113 (1984): "At least this much can be said: All agree that Congress cannot bar all remedies for enforcing federal Constitutional rights." See also Bartlett v. Bowen, 816 F. 2d 695 (D.C. Cir. 1987):

> [A] statutory provision precluding all judicial review of Constitutional issues removes from the courts an essential judicial function under our implied constitutional mandate of separation of powers, and deprives an individual of an independent forum for the adjudication of a claim of constitutional right. We have little doubt that such a "limitation on the jurisdiction of both state and federal courts to review the constitutionality of federal legislation . . . would be [an] unconstitutional" infringement of due process.

Id. at 703, quoting M. Redish, Federal Jurisdiction: Tensions in the Allocation of Judicial Power 27 (1980) (emphasis in original).

Plaintiffs relied on United States v. Klein, supra, to argue that Congress cannot use the withdrawal of jurisdiction as a means to an unconstitutional end. In that case, plaintiff had recovered a judgment for the proceeds of cotton sequestered by Union forces during the Civil War. A Congressional statute authorized a lawsuit in the Court of Claims for the return of property to its owner on proof that he had not "given aide or comfort" to the Confederacy, and the Supreme Court had earlier held that a presidential pardon was sufficient to satisfy this requirement. However, while Klein's appeal was pending in the Supreme Court, Congress passed a law declaring that such a pardon could not be admissible in the Court of Claims as evidence of loyalty and that, indeed, it was to have the opposite effect.

The issue before the Supreme Court in Klein was thus identical to the issue in the Claims Court cases: Can Congress pass a statute curtailing the jurisdiction of the Claims Court to hear a case before it? The Court said no; it held that it would not give effect to a jurisdictional statute that would require a court to rule in the government's favor in a pending claim because the statute at issue "prescribed a rule of decision in a case pending before the courts, and did so in a manner that required the courts to decide a controversy in the Government's favor." United States v. Sioux Nation of Indians, 448 U.S. 371, 404 (1980). As the court observed in Sioux Nation, "[O]f obvious importance to the Klein holding was the fact that Congress was attempting to decide the controversy at issue in the Government's own favor." Id. at 405. There were thus two important features in the Klein holding: "that Congress was mandating a result in favor of the federal government in a particular pending case and that Congress was attempting to dictate the rule of decision in the case." National Juvenile Law Center, Inc. v. Regnery, 738 F. 2nd 455, 465 (D.C. Cir. 1984).

Klein also stands for another proposition: Congress cannot use limitations on federal court jurisdiction to achieve a result that violates the Constitution. In other words, jurisdictional statutes, like all other laws, are subject to Constitutional limitations, and Congress may not enact jurisdictional curtailments that prevent the vindication of Constitutional rights. See, e.g., Battaglia v. General Motors Corp., supra, 169 F. 2d at 257:

> [T]he exercise by Congress of its control over jurisdiction is subject to compliance with at least the requirements of the Fifth Amendment . . . . [W]hile Congress has undoubted power to give, withhold, and restrict the jurisdiction of courts other than the Supreme Court, it must not so exercise that power as to . . . take private property without just compensation . . . .

The Claims Court distinguished Klein on the ground that it "did not involve a complete withdrawal of the consent to sue," 13 Cl. Ct. at 667, and that the Section 177 Agreement substituted an alternative means of providing compensation:

> [I]n none of these cases has Congress abolished plaintiffs' claims. The Compact recognizes the United States obligations to compensate for damages from the nuclear testing program and the Section 177 Agreement establishes an alternative tribunal to provide such compensation.

Id. at 688.

6. Alternative Means Of Obtaining Compensation

At the time the United States and Marshallese negotiators were working out the Section 177 Agreement, the Supreme Court decided Dames & Moore v. Regan, 453 U.S. 654 (1981), a case arising out of the Iran hostage situation in 1979 – 1980. As part of the settlement leading to the release of the U.S. hostages held in Iran, the United States agreed to terminate all cases pending against Iran in U.S. courts and to have them resolved in an alternative forum, the United States – Iran Claims Tribunal.

The Supreme Court has long held that when property is taken for public use, "there must be at the time of taking 'reasonable, certain and adequate provision for obtaining compensation.'" Blanchette v. Connecticut General Insurance Corp., 419 U.S. 102, 124-125 (1974), quoting Cherokee Nation v. Southern Kansas Railroad, 135 U.S. 641, 659 (1890). (Emphasis added.) Plaintiff in Dames & Moore argued that the U.S. – Iran Claims Tribunal could not provide "reasonable, certain and adequate provision for obtaining compensation," because some claims might not be adjudicated by the Tribunal and others might not be paid in full. The Supreme Court, however, upheld the settlement agreement, but noted that the plaintiff could always bring a taking claim under the Tucker Act "to the extent [plaintiff] believes it has suffered an unconstitutional taking by the suspension of the claims." 453 U.S. at 689-690.

Justice Powell's concurring opinion drove this point home. "The [majority] opinion makes clear that some claims may not be adjudicated by the [U.S. – Iran] Claims Tribunal, and that others may not be paid in full," he wrote. 453 U.S. at 654. The conclusion of his short concurring opinion underscores the validity of our position:

> The Court holds that parties whose valid claims are not adjudicated or not fully paid may bring a "taking" claim against the United States in the Court of Claims, the jurisdiction of which this Court acknowledges. The Government must pay just compensation when it furthers the Nation's foreign policy goals by using as "bargaining chips" claims lawfully held by a relatively few persons and subject to the jurisdiction of our courts. The extraordinary powers of the President and Congress

> upon which our decision rests cannot, in the circumstances of this case, displace the Just Compensation Clause of the Constitution.

Id.

Dames & Moore demonstrates that Congress can withdraw jurisdiction and establish an alternative means of providing just compensation, but the cases upholding these procedures have always preserved the right of judicial review in the Claims Court to challenge the adequacy of the alternative method. See, e.g., Ruckelshaus v. Monsanto Co., 467 U.S. 986 (1984), in which a federal law compelled the surrender of proprietary information in connection with the licensing of insecticides by the Environmental Protection Agency. The law provided an arbitration scheme to compensate license applicants for the loss of their property rights in the information. Monsanto argued that this scheme would not provide adequate compensation, but the Supreme Court upheld the procedure established by the statute because "the Tucker Act is available for a remedy for any uncompensated taking Monsanto may have suffered as a result of the operation of the challenged provisions of [the statute]." Id. at 1019.

A similar issue arose in Blanchette, supra, which was a challenge to the constitutionality of the Regional Rail Reorganization Act. The Act provided for the consolidation of seven railroads into the newly reorganized Conrail. In return, the participating railroads would receive securities and government-backed obligations. Penn Central challenged this scheme, arguing that the securities might not amount to adequate compensation for the properties it was obliged to convey to Conrail. The Supreme Court agreed that such a shortfall might occur, but it pointed out that Penn Central could always go to the Claims Court in such a case:

> Congress fully expected that this consideration would provide the minimum compensation required by the Constitution; it wished to provide no more. If, however, that hopeful expectation should not be fulfilled, and the consideration exchanged for the rail properties should prove to be less than the Constitutional minimum, the Tucker Act will be available as the jurisdictional basis for a suit in the Court of Claims to recover any Constitutional shortfall.

419 U.S. at 148. Only the availability of the Tucker Act remedy saved the constitutionality of the scheme.

With this constitutional background, the U.S. and Marshallese negotiators provided both for the $150 million settlement and additional funding for the Nuclear Claims Tribunal to hear claims that might argue that the $150 million settlement would be insufficient.

In the Claims Court cases, no saving possibility existed of going back to the Claims Court because Article XII removed all jurisdiction in U.S. courts, including the Claims Court. As the Claims Court noted:

> Article 12 of the Section 177 Agreement by necessary implication amends the Tucker Act. The consent of the United States to be sued in the Claims Court on plaintiffs . . . claims . . . has been withdrawn.

13 Cl. Ct. at 690. The Court correctly observed that "the United States unquestionably intended that the Section 177 Agreement would be a complete settlement of all claims arising from the nuclear testing program." Id. at 684. If, however, "that hopeful expectation should not be fulfilled," Blanchette, 419 U.S. at 148, the Tucker Act remedy that saved the rail reorganization act and the Iran hostages settlement would not be available.

It is important to note that the Supreme Court has held that, as noted above, when property is taken for public use there must be "at the time of taking" a "reasonable, certain and adequate" provision for obtaining compensation. Blanchette, supra. The Claims Court specifically admitted that it could not determine whether the $150 million settlement was adequate and therefore met these requirements:

> The settlement procedure, as effectuated through the Section 177 Agreement, provides a "reasonable" and "certain" means for obtaining compensation. Whether the settlement provides "adequate" compensation cannot be determined at this time.

13 Cl. Ct. at 689. However, it went on to hold that it was unnecessary to make such a determination until the alternative procedure – the Claims Tribunal method – had been exhausted: "This alternative procedure for compensation cannot be challenged judicially until it has run its course." Id.

It is arguable that the Claims Court confused the adequacy of the $150 million settlement with the ability of the Nuclear Claims Tribunal to ensure that just compensation in the full constitutional sense will ultimately be paid to the plaintiffs. As to this latter point, the Supreme Court has repeatedly stated that a claimant is entitled to such a determination at the outset. For example, in Blanchette, supra, the Supreme Court expressly stated that the availability of a Tucker Act remedy for a taking for which just compensation may not be paid is ripe for judicial determination at the time of the taking, prior to a "definitive" determination that [the taking] has reached unconstitutional dimensions." 419 U.S. at 123-124. As the Court noted, "failure to decide the availability of the Tucker Act would raise the distinct possibility that those plaintiffs would suffer [a taking] without adequate assurance that compensation will ever be provided." Id. at 124.

In every case in which the Supreme Court has reviewed a compensation procedure other than immediate recourse to a U.S. court, it has held that the adequacy of the procedure as such is ripe for determination before the claimant can be forced to resort to it. In Dames & Moore, Blanchette and Ruckelshaus, the court found the necessary assurance because it construed the statute in question as preserving the possibility of ultimate resort to the Tucker Act should the award under the alternative procedure prove inadequate.

Indeed, the Marshallese plaintiffs argued in the 1980s that the total resources available to the Nuclear Claims Tribunal would fall far short of the amount needed to provide the "full monetary equivalent of the property taken," as required by the Fifth Amendment. United States v. Reynolds, 397 U.S. 14, 18 (1970). However, the Claims Court was unwilling even to entertain proof that the total resources available to the Claims Tribunal would fall short of the amount necessary to provide adequate compensation.

The Federal Circuit reached a similar conclusion as the Claims Court:

> Congress intended the alternative procedure to be utilized, and we are unpersuaded that judicial intervention is appropriate at this time on the mere speculation that the alternative remedy may prove to be inadequate.

People of Enewetak, 864 F. 2d at 136. (Emphasis added.)

7. Conclusion

Both the 1987 Juda decision in the Claims Court and the 1988 Enewetak – Rongelap decision in the Federal Circuit opened the door for all parties to argue that it is appropriate at this time to examine the adequacy of the funds provided for the Nuclear Claims Tribunal. The Tribunal will issue its ruling in the Bikini case within the next month or so, and it is highly likely that the Bikini judgment, together with the Enewetak decision and other pending cases, will result in a short fall of hundreds of millions of dollars in the Tribunal, just as the plaintiffs predicted in the 1980s.

The gist of the court decisions in the 1980s was that the courts were unwilling to determine the adequacy of the $150 million fund at that time. As the Claims Court in the Juda case noted: "Whether the settlement provides 'adequate' compensation cannot now be determined at this time." 13 Cl. Ct. at 689. The Federal Circuit used almost identical language, refusing to speculate on the adequacy of the alternative remedy "at this time." 864 F. 2d at 136. It went on to distinguish the Blanchette case and said that it did not "read Blanchette to mandate such a determination in advance of the alternative provided." Id. Indeed, the Claims Court decision in Juda arguably invited a judicial re-examination, holding that the Claims Tribunal – Section 177 "procedure for compensation cannot be challenged judicially until it has run its course." 13 Cl.Ct. at 689.

We do not need to challenge the constitutionality or "correctness" of these rulings. The fact is that the Supreme Court has never expressly sustained the validity of an alternative procedure for determining just compensation that does not include a provision for ultimate judicial review. The United States argued in Blanchette that a Tucker Act remedy was available in all cases in which, "whatever the probabilities, the parties and this Court have no absolute assurance" that just compensation will be available within a reasonable time. 419 U.S. at 123. In fact, the United States went so far as to argue that, where a "theoretical possibility" exists that a taking may remain uncompensated, "an injunction . . . might be appropriate unless, as we contend, a remedy for any otherwise uncompensated taking will be available under the Tucker Act." Id.

Our argument is much simpler: The courts recognized that the $150 million settlement under the Section 177 Agreement was designed to provide a "reasonable, certain and adequate" provision for obtaining compensation, but only time would tell if the funds were adequate. The track record clearly shows that the settlement has not provided "adequate" compensation, as provided by the Fifth Amendment. This opens the door both to potential litigation as well as good faith negotiations with the Executive Branch.

JMW:jj

ATTACHMENT IV:
DECISIONS OF THE NUCLEAR CLAIMS TRIBUNAL

A Summary of Key Decisions of the Marshall Islands Nuclear Claims Tribunal, the "Alternate Forum" to the U.S. Claims Court for Providing Compensation in Settlement of Damages from the U.S. Nuclear Testing Program in the Republic of the Marshall Islands

ATTACHMENT IV: DECISIONS OF THE NUCLEAR CLAIMS TRIBUNAL

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INTRODUCTION

When the U.S. Claims Court (now the U.S. Court of Federal Claims) dismissed the cases brought by 14 separate Marshall Islands atolls[1] in November 1987, it noted that "in none of these cases has Congress abolished plaintiffs' claims. The Compact (of Free Association) recognizes the United States obligations to compensate for damages from the nuclear testing program and the Section 177 Agreement establishes an alternative tribunal to provide such compensation." [13 Cl. Ct. at 688]

Section 177 of the Compact provides that "The Government of the United States accepts the responsibility for compensation owing to the citizens of the Marshall Islands . . . for loss or damage to property and person of the citizens of the Marshall Islands . . . resulting from the nuclear testing program which the Government of the United States conducted in the Northern Marshall Islands between June 30, 1946, and August 18, 1958."

[1] The 14 complaints against the U.S., which the Claims Court consolidated for pretrial preparation, had been filed by the people of Bikini; Enewetak; Maloelap; Ailinginae; Wotho; Rongerik; Ujae; Utirik; Rongelap; Taka, Bikar, Jemo, Bokaak and Erikub; Mejit; Wotje; Lae; and Ailuk.

The Claims Court also acknowledged that "The settlement procedure, as effectuated through the Section 177 Agreement, provides a 'reasonable' and 'certain' means for obtaining compensation. Whether the settlement provides 'adequate' compensation cannot be determined at this time." [13 Cl. Ct. at 689]

The Federal Circuit Court reached a similar conclusion, stating that "Congress intended the alternative procedure to be utilized, and we are unpersuaded that judicial intervention is appropriate at this time on the mere speculation that the alternative remedy may prove to be inadequate." [864 F. 2d at 136]

This paper summarizes some of the major decisions that have been reached by the Marshall Islands Nuclear Claims Tribunal, "the alternate forum" referred to by the Claims Court and Federal Circuit Court for providing compensation in settlement of damages from the U.S. nuclear testing program.

ESTABLISHMENT OF THE TRIBUNAL

Between 1946 and 1958, the United States detonated 67 nuclear weapons in what is now the Republic of the Marshall Islands (RMI). Consequences of the Nuclear Testing Program (NTP) included the long-term displacement of Marshallese from their homelands, severe radiological contamination that in the absence of decontamination efforts precludes resettlement to this day, and a myriad of radiation-induced health effects dominated by cancers.

The specifics of those consequences, however, were largely unknown to the Marshall Islands Nuclear Claims Tribunal when it was established in 1988. There was no case file passed on from the Claims Court to the Tribunal and virtually no evidence on which to make decisions regarding compensation. In fact, that was the case because there had been no real effort to assess or specify the loss or damage resulting from the NTP in the Marshall Islands either in the Claims Court or during the bilateral government-to-government negotiations that resulted in the Section 177 Agreement. The extent to which such loss or damage had been specifically acknowledged by the U.S. was limited to the four atolls included in the Section 177 Agreement and to certain individuals from those four atolls to whom ex gratia payments had been made as a result of specific cancers or other medical conditions that had been diagnosed in them.

The Section 177 Agreement gave the Tribunal exclusive jurisdiction "to render final determination upon all claims past, present and future, of the Government, citizens and nationals of the Marshall Islands which are based on, arise out of, or are in any way related to the Nuclear Testing Program." [Article IV, Section 1(a)] It provided a fund of $150 million that was intended to generate $270 million in proceeds for disbursements over the 15-year period of the Compact of Free Association "as a means to address past, present, and future consequences of the Nuclear Testing Program." [Article I, Section 2] Of that amount, $45.75 million was specifically allocated for "payment of monetary awards made by the Claims Tribunal." [Article II, Section 6(c)]

However, the amount of the disbursements provided under the terms of Section 177 represented a political settlement between the governments of the United States and the Marshall Islands and was in no way a result of any effort to quantify the magnitude of the actual damages nor to assess those damages monetarily.

The Tribunal was fully constituted in late 1988 and began the process of collecting claims and establishing procedures for evaluating their validity. It sought information and expert advice about the testing program and its effects from a wide variety of sources and considered various approaches toward determining causation for compensation purposes. As directed by the Section 177 Agreement, the Tribunal referred "to the laws of the Marshall Islands, including traditional law, to international law and, in the absence of domestic or international law, to the laws of the United States." [Article IV, Section 3 - Governing Law]

DEVELOPING A PERSONAL INJURY COMPENSATION PROGRAM

Early in its existence, the Tribunal considered an approach under which each personal injury claim would be pursued on an individual adversarial basis and all claimants would be required to demonstrate, by a probability of causation, that their injuries were a result of the level and type of radiation exposure they had received as a result of the Nuclear Testing Program.

But when the Tribunal attempted to obtain information from the U.S. about the levels of radiation to which people residing on the various atolls and islands had been exposed, virtually the only information forthcoming was for those whom the U.S. had admitted exposure - - - the people who had been on Rongelap, Ailinginae, or Utrik during the Bravo test on March 1, 1954. Without reliable information about the exposure levels of individuals who had been living on other atolls, there could be no showing of proof, or even of a probability, that radiation had caused the medical conditions suffered by and claimed by such individuals.

In 1989, the Tribunal became aware of the Radiation-Exposed Veterans Compensation Act of 1988 (U.S. Public Law 100-321), which granted a presumption of service connection to American military personnel who had been involved in nuclear testing activities for a number of "listed" radiogenic medical conditions.

When the Tribunal sought information about how the veterans' "presumed list" was developed, it had the good fortune to speak with Dr. Robert W. Miller, M.D., then Chief of Clinical Edipemiology at the U.S. National Cancer Institute, National Institutes of Health. Formerly an investigator with the Atomic Bomb Casualty Commission in Hiroshima in the 1950s, Dr. Miller is now Scientist Emeritus at NCI. Dr. Miller became sufficiently interested in the task facing the Tribunal that he traveled to Majuro in late 1989 to make his expertise available.

In the introduction to a paper he authored for the Tribunal, Radiations Effects Among the Marshallese, Dr. Miller wrote: "My objective is to advise on diseases that are known to be related to radiation exposure. It is obvious that without exposure, there can be no effect. One should err toward leniency, but should not accept impossible claims of exposure." Dr. Miller also advised the Tribunal that the excess of thyroid nodules in the Marshall Islands, as reported in the Journal of the American Medical Association in 1987,[2] was "astonishing" and recommended that various types of medical monitoring and diagnosis be carried out on the Marshallese people.

In specifically addressing his objective, Dr. Miller acknowledged the direction which the Tribunal had given him, stating "I understand that, no matter what, the Congressional list is to be accepted. An additional list is presented. Both should apply to Marshallese who were on the Islands at some time between July 1, 1946, and September 30, 1958, including those in utero at the ending date." He then

[2] The abstract of a paper entitled Thyroid Neoplasia in Marshall Islanders Exposed to Nuclear Fallout (JAMA, Aug. 7, 1987, Vol. 258 No. 5, pp 629-636) summarizes the results of screening of more than 7,000 Marshall Islanders from 14 atolls for thyroid nodules and concludes that "an excess of thyroid nodules was not limited only to the two northern atolls but extended throughout the northern atolls."

proceeded to identify the 13 conditions on the "Congressional List" and an additional 10 "Disorders that are not on the Congressional list, but are known to be induced by radiation."

Dr. Miller noted that the conditions on the latter list "are recognized as related to radiation by the most recent UNSCEAR Report, BEIR III (and probably the more recent BEIR V) report, the NIH PC Working Group and/or by excessive occurrence among Japanese a-bomb survivors."

In December 1989, the Tribunal adopted Dr. Miller's recommended 23 medical conditions to its "list of medical conditions irrebuttably presumed to be the result of the Nuclear Testing Program." It then turned its attention to determining appropriate levels of compensation for the listed radiogenic diseases. In its effort to address this complex issue, the Tribunal was helped greatly when it learned, in 1990, of U.S. legislation commonly referred to as the "Downwinders' Act" which had been passed into law by the Congress that year (PL 101-426).

In that Act, the Congress found that fallout emitted from the atmospheric nuclear tests conducted at the Nevada Test Site ("NTS") exposed American civilians "to radiation that is presumed to have generated an excess of cancers among those individuals." [underlining added] Based on that finding, the Congress established a program which provides compensation for specified diseases to U.S. civilians who were physically present in any "affected area" during the periods of atmospheric testing in Nevada (i.e. between January 1951 and October 1958 or during July 1962).

The presumptive approach adopted by the U.S. for both its military personnel and civilians clearly reflected both the need for an efficient, simple, and cost-effective program and the recognition of the difficulties of individual proof of causation of radiation-induced injuries where exposure level data was not available. This approach was also consistent with the Tribunal's enabling RMI legislation, which provides that "In order to facilitate efficient and uniform payments of compensation, the Tribunal shall issue regulations establishing a list of medical conditions which are irrebuttably presumed to be the result of the Nuclear Testing Program." [42 MIRC §123(13)]

Accordingly, the Tribunal determined to pattern its approach to personal injury compensation after the Downwinders' program, basing it on the same two presumptions: 1) that residency in the Marshall Islands during the testing period constitutes a basis for assuming exposure to levels of ionizing radiation sufficient to induce a listed medical condition and 2) that the manifestation of a listed radiogenic medical condition is presumed to have been caused by the exposure to radiation created by the NTP.

In adopting this approach, the Tribunal concluded that the failure of the U.S. to maintain contemporaneous exposure data during and after the testing period, the lack of advanced medical diagnostic services available locally, and the absence of baseline non-radiation risk factors for the people of the Marshall Islands all combined to make the presumptive method of assessing claims both reasonable and fair.

In deciding to employ an administrative approach instead of an adjudicatory system to address the bulk of non-controverted personal injury claims, the Tribunal also acknowledged that the latter functions well when the determination of liability is at issue in tort claims. In the case of nuclear damages, however, the United States had already accepted responsibility for compensation owing to Marshallese citizens so determination of liability was not an issue.

Setting Levels of Compensation for Personal Injuries

The Tribunal acknowledged that typically, an administrative approach sacrifices the high degree of individual treatment characteristic of an adjudicative system and that using such an approach would reduce its ability to consider each case on its own merits. Ultimately, however, it decided that the sacrifice of individual consideration of personal injuries was justifiable on the basis of increased certainty to individuals as to award level, maintenance of a larger portion of the claims fund for actual payments to claimants rather than for procedural costs, and overall group justice.

Once the Tribunal had adopted its list of compensable medical conditions, it then began to determine how to classify those conditions into different classes of awards and what amounts of compensation were appropriate for each class. Ultimately, the Tribunal determined that the amount of compensation would be based on a table of awards for specific injuries, with deductions for prior compensation and, at the higher levels, for age.

The classification determination was based on a matrix approach which examined such factors as the general prognosis for each condition, the relative expense of treatment, and a severity factor which was meant to take into account the severity of pain and suffering. That process resulted in the assignment of the listed medical conditions into a hierarchy of bands or classes.

The amounts established for each class were intended to cover both economic and non-economic losses. The cost of medical care is not reflected in the compensation award amounts. Treatment for a compensable condition is specifically provided for through enrollment of personal injury awardees in the health care program established under Article II, Section 1(a) of the Section 177 Agreement.

A significant factor in setting the levels of compensation for each of those classes was that a major part of the compensation would be for pain and suffering. Recognizing the difficulty in setting a monetary value for pain and suffering, the Tribunal looked to values awarded in similar situations as a starting point, including: (1) amounts of compensation paid to Marshallese radiation victims in the past; (2) amounts of compensation paid by the U.S. to American citizens harmed by radiation exposure; (3) amounts of compensation paid in other mass tort settlement programs; (4) amounts of compensation paid for similar conditions in other countries and circumstances; and (5) other awards in the U.S.

That review revealed a wide range of compensation values. For example, in 1977 the Congress authorized payment of $25,000 to each individual who was a resident of Rongelap or Utirik atolls on March 1, 1954 (the date of the Bravo test), and "from whom the thyroid gland or a neurofibroma in the neck was surgically removed, or who has developed hypothyroidism, or who develops a radiation-related malignancy, such as leukemia." [P.L. 95-134, Title I, Section 104(a)(1)] That same law also authorizes "compassionate compensation" payments of up to $25,000 to any individual "who has suffered any physical injury or harm from a radiation-related cause but who is not an individual described in paragraph (1)" [P.L. 95-134, Title I, Section 104(a)(3)] and "additional compassionate payment not to exceed $100,000 to the heirs or legatees" of any deceased individual whose demise "is directly related to the thermonuclear detonation" on March 1, 1954.

Records provided to the Tribunal by the U.S. Government documented numerous $25,000 payments, including many for surgical treatment of non-malignant thyroid conditions, at least one $100,000 payment to the heirs of a Rongelap individual who died of leukemia, and at least one $50,000 payment to the heirs of a Rongelap individual who died of stomach cancer.

The amount paid to U.S. civilians under P.L. 100-426 (Radiation Exposure Compensation Act of 1990) is usually $50,000 but may be as much as $75,000 if the claimant "participated on-site." The total benefits paid to former military personnel under the Radiation-Exposed Veterans Compensation of 1988 vary widely depending on the degree of disability and other factors.

Under the DDT mass tort settlement, there was a schedule of awards ranging from $10,000 to $60,000 for cancers. A 1988 study by the International Court of Justice entitled Compensation of Injuries indicated that the average net compensation to plaintiffs in asbestos cases from 1980 to 1982 was $48,000. Under the U.S. Vaccine Injury Program, there is a cap of $250,000 for pain and suffering, including death.

In a tort case heard in Australia dealing with a claim for damages from radiation exposure which resulted in the psychological condition of agoraphobia [Johnstone v. Commonwealth], the plaintiff was awarded $670,000 (Australian dollars). The value, in U.S. dollars, of an Australian COMCARE award for permanent disability, including radiation caused disabilities, was determined to be $74,300. Another Australian COMCARE award for death, including from radiation, was valued at $111,000 U.S. dollars.

In a U.S. court determination of damages for thyroid cancer caused by exposure to radiation from the Nevada testing site, $100,000 was awarded [Allen v. U.S., 588 FSupp 247], although that case was later reversed on other grounds. The range of death awards made by the same court was $250,000 to $625,000. The International Court of Justice study found that the median value for loss of limb was $154,000 but that the average or mean award was more than twice that amount.

In setting the award amounts for its personal injury compensation program, the Tribunal decided that it would be guided by the following principles:

1) Compensation values should be higher than most programs of mass tort settlement, in light of the fact that those programs do not necessarily reflect "full compensation" but rather are usually based on the amount available for distribution.

2) Values should be higher than past compensation for Marshall Islanders for similar conditions, in order to reflect the passage of time and the fact that Tribunal awards "shall be paid on an annual pro-rata basis" rather than in a lump sum. [Section 177 Agreement, Article II, Section 7(b)]

3) Values will not match higher end awards reviewed by the Tribunal because such awards are likely to depend on the circumstances of the specific case and include such factors as lost income that are typically not present in the Marshall Islands in the same magnitude as in the United States.

4) A substantial component of the award is medical care and treatment which is specifically provided under the Section 177 health program and is not reflected in the compensation amounts.

Based on its consideration of the foregoing, the Tribunal established a six-level classification scheme for awards ranging from $12,500 to $125,000. It determined to use as a benchmark the $50,000 award for nonrecurrent thyroid cancer that is the same amount paid by the U.S. to American civilians who were "downwind" from the Nevada nuclear testing site. Awards for other conditions were scaled up or down from that value based on their severity as determined by the matrix ranking.

For example, while the U.S. compensation program for downwinders does not recognize the difference between nonrecurrent and recurrent thyroid cancers, the Tribunal concluded that the impact of multiple treatments on a claimant's life made such an approach unfair and unjustified and determined to award $75,000 for recurrent cancers. In doing so, it noted that a similar approach had been used by the U.S. in making multiple payments to Marshallese citizens who had undergone multiple thyroidectomies.

Extending this concept to the entire compensation scheme, the Tribunal further concluded that fundamental fairness required a significant monetary distinction between cancers having widely varying impacts on the quality of an individual's life. Cancers which are nearly always fatal were placed in Class A ($125,000) while those with relatively lesser impacts were placed in Class B ($100,000), Class C ($75,000), or Class D ($50,000). Benign thyroid conditions requiring surgery were placed in Class E ($37,500) while those not requiring surgery were put in Class F ($12,500).

The Tribunal also determined that various adjustments should be made to certain awards for personal injury: (1) Prior compensation from the U.S. for the same injury or damage will be deducted dollar for dollar from awards made by the Tribunal; (2) Tribunal awards for Class A conditions shall be reduced by $1,000 for each year an individual has lived between the age of 45 and the age at which the condition first manifested, up to a maximum reduction of $25,000; and (3) A claimant suffering from a Class B or Class C condition that is deemed to be in "end stage," with a prognosis consistent with that of Class A conditions (i.e., one which will result in death in less than five years from the date of manifestation), may be awarded compensation at the level of a Class A condition. This last provision for adjustment in the amount of a personal injury award reflects acknowledgement of the historically poor diagnostic capabilities in the Marshall Islands, a factor that frequently results in the premature death of an individual due to a medical condition which would not generally be fatal if diagnosed early.

In 1994, in order to comply with newly adopted legislation, the regulations for the Tribunal's personal injury compensation program were amended to extend the presumptions of exposure and causation for listed medical conditions to individuals who were born after the testing program had ended in 1958. At the same time, the Tribunal also amended its regulations to provide for reduction in the amount of such awards by fifty percent.

The Tribunal's personal injury compensation program was formally adopted in August 1991, more than 45 years after the first nuclear test in the Marshall Islands. At that time, the list of compensable conditions totaled 25, reflecting some revisions to the list of 23 conditions adopted in late 1989: acute radiation and beta burns were made separate conditions; salivary gland tumors and severe mental retardation were added to the list; and brain cancer was deleted. The 25 conditions initially adopted by the Tribunal are listed as numbers 1-25 in Attachment 1. By the end of 1991, net compensation awards (after deductions) had been made in the amount of $10.9 million to 300 individuals for a total of 381 medical conditions.

<u>Annual Review of the List of Compensable Conditions</u>

The one universal truth about the state of medical and scientific knowledge is that it is ever changing. What is only suspected or hypothesized now may, in the future, become a well understood medical fact. This is particularly the case in the area of health effects of exposure to radiation. Recognizing this, the RMI legislative act establishing the Tribunal directs that the list of medical conditions presumed to be the result of the nuclear testing program be reviewed on an annual basis.

In conducting annual reviews, the Tribunal has had as its goal the identification, understanding, and appropriate use of the most current scientific research and knowledge. In carrying out this mandate, the Tribunal has looked principally to the research findings of the Radiation Effects Research Foundation (RERF) in Japan; the conclusions contained in the 1990 report of the Committee on Biological Effects of Ionizing Radiation (BEIR V) of the National Research Council, National Academy of Sciences; a broad range of medical and scientific findings published in various professional journals; and the views of two experts on the health effects of exposure to radiation, the aforementioned Dr. Robert Miller of NCI and Dr. Edward Radford, M.D. Dr. Radford, also an epidemiologist, was a member of the first NAS appointed Committee on the Biological Effects of Ionizing Radiation (BEIR I, 1972) and was Chairman of the subsequent BEIR III Committee from 1978-80.

As a result of the 1992-93 review, the Tribunal amended its list to include two additional conditions, tumors of the parathyroid gland and unexplained hyperparathyroidism (numbers 26 and 27 in Attachment 1). The 1994 review focused on establishing a more precise definition of the term "occult" in connection with non-malignant thyroid nodular disease (number 17 on the list) but concluded with the Tribunal declining to make a more formal definition.

During 1995-96, the Tribunal undertook a broad and comprehensive review of the presumed medical condition list focusing on all types of cancer. After extensive consideration of written submissions and recommendations, seven new conditions were added to the list (numbers 28-34 in Attachment 1): bronchial cancer (including cancer of the lung and pulmonary system), cancer of the brain, cancer of the central nervous system, cancer of the kidney, cancer of the rectum, cancer of the cecum, and non-melanoma skin cancer in individuals who were diagnosed as having suffered from beta burns following the Bravo event in 1954. With specific regard to bronchial cancer, the Tribunal formally stated that "the compensation amount reflects a reduction based upon the recognition that smoking is an important contributor to the development of this condition" and that "once standards for determination of non-smoking status have been developed, bronchial cancer for non-smokers will be classified separately from bronchial cancer generally. It is anticipated it will be a Class A condition ($125,000)." [Statement of Determination dated March 5, 1996]

The review carried out during 1997-98 resulted in the addition of bone cancer to the list (number 35 in Attachment 1), expansion of the condition of cancer of the urinary bladder to cancer of the urinary tract (consistent with a similar expansion provided by the U.S. on behalf of its veterans), and expansion of cancer of the brain to tumors of the brain, including schwannomas but not including other benign neural tumors. In addition, in order to address concerns raised at a public hearing and in the RMI national legislature (Nitijelã), that review also focused on the conditions of diabetes, strokes, cataracts, and genetic effects in subsequent generations. The expert opinions presented to the Tribunal in regard to those conditions found insufficient evidence for their inclusion on the compensable list.

The 1999-2000 review is in progress. It is focused on identifying credible criteria and standards to determine non-smokers in awards made for bronchial cancer; further clarifying the specific types of brain tumors which qualify for compensation; and review of restrictions and limitations applicable to certain presumed conditions on the Tribunal's compensable list.

<u>Analysis of Personal Injury Awards as of August 15, 2000</u>

As of August 15, 2000, the Tribunal had awarded $72,634,750 in net compensation for the 35 presumed radiogenic medical conditions covered under its regulations, an amount nearly $27 million above and beyond the $45.75 million available for actual payment of awards over the 15-year term of the Compact. This amount has been awarded to a total of 1,694 individuals for a total of 1,833 compensable conditions.

For this analysis, those awards have been divided into five groups, based on how various U.S. programs treat each condition, and separated based on whether the individual was physically present (including in utero) during the testing period:

1) Conditions covered by the U.S. Radiation Exposure Compensation Act - The 13 conditions originally listed in that Act were the first 13 adopted by the Tribunal to its presumptive personal injury compensation program (numbers 1-13 in Attachment 1). U.S. Senate Bill No. 1515, introduced in 1999 and enacted as Public Law 106-245 in July 2000, expanded that list by five additional conditions (numbers 14, 15, 16, 18, and malignant tumors compensated by the Tribunal under number 29 in Attachment 1). Through August 15, 2000, net compensation in the amount of $39,843,000 had been awarded by the Tribunal for these conditions to individuals who were physically present during the test period (or, in the case of one individual born on Bikini in 1971, whose death from lymphoma in 1982 was found by the Tribunal to be "sufficiently connected to the nuclear testing program to warrant an award of full compensation"). An additional $3,912,500 million had been awarded to those born after the testing period.

2) Conditions covered by the U.S. Radiation-Exposed Veterans Compensation Act - American military personnel who were physically "on site" benefit from a presumption of causation for the additional condition of kidney cancer that is not on the RECA list. The Tribunal has awarded $634,000 for that condition to individuals who were present during the test period and $62,500 to one individual who was born after the testing. The Veterans' Act does not set specific compensation amounts for its conditions, giving instead a monthly disability payment, so there is no basis on which to compare amounts of individual awards.

3) Conditions clearly linked to fallout from the Bravo test - From the outset of its program, the Tribunal recognized medically documented cases of acute radiation sickness and beta burns as compensable. Awards for those conditions have been made to a number of individuals who were residing on Rongelap at the time of the Bravo event. These two conditions are not on any U.S. list because no American, military or civilian, was subjected to the level and type of exposure that the Rongelap people were. In addition, two cases of severe growth retardation due to childhood thyroid damage and at least seven cases of hypothyroidism have been acknowledged by the U.S. as having been caused by fallout from the Bravo event. Net awards totaling $2,012,500 have been made for these conditions.

4) Conditions on the Veterans' Administration regulatory list - U.S. veterans may receive disability compensation for seven additional conditions on the Tribunal's list if "sound scientific and medical evidence supports the conclusion that it is at least as likely as not the veteran's disease resulted from exposure to radiation in service." VA regs provide that "factors to be considered" in deciding a veteran's claim "include (1) the probable dose, in terms of type, rate and duration in inducing the disease; (2) the relative sensitivity of the involved tissue to induction by ionizing radiation of the specific pathology; (3) the veteran's gender and pertinent family history; (4) the veterans' age at time of exposure; (5) the time-lapse between exposure and onset of the disease; and (6) the extent to which exposure to radiation, or other carcinogens, outside of service may have contributed to development of the disease." The VA regs give recognition of these seven conditions as being radiogenic, albeit not on a strict presumptive basis. Tribunal awards for those conditions total

$23,014,000 for those present during the testing period and $1,637,500 for those born after the testing period.

5) Conditions deemed radiogenic by the Tribunal but not known to be on U.S. lists - Five conditions for which the Tribunal awards compensation are not known to be on any U.S. lists but have been deemed radiogenic by the Tribunal based on current scientific and medical research: benign salivary gland tumors, benign parathyroid gland tumors, hyperparathyroidism, severe mental retardation, and unexplained bone marrow failure. Through August 15, 2000, Tribunal awards for those conditions totaled $1,112,500 for those present and $406,250 for those born after the testing period.

Status of Annual Pro-Rata Payment of Personal Injury Awards

The 177 Agreement provides that "All monetary awards made by the Claims Tribunal . . . shall be paid on an annual pro-rata basis from available funds until all such awards are paid in full." Funds available for such payment are derived through annual distributions from the Fund of $2.25 million the first three years and $3.25 million for the remaining 12 years of the Compact.

In making its awards, even though there were adequate funds to fully pay those first awards in 1991, the Tribunal chose to take a conservative approach to attempt to balance the interest of current awardees with those of future recipients, so that in the event that total awards over the life of the Tribunal exceeded the $45.75 million provided for the 15 year Compact period, those claimants receiving awards at the end of the period would be treated equitably compared to those receiving awards in 1991.

When awards were first made in 1991, the recipients were issued initial payments of 20% of their awards. Subsequent annual pro rata payments were made each October as follows: 5% in 1991, 8% in 1992, 7% in 1993, 10% in 1994, and 5% in 1995. For each new award made after October 1991, an initial payment equal to the accumulated percentage received by previous awardees was made. Thus, new awards made beginning in October 1995 received an initial payment of 55%.

By March 1996, however, the Tribunal had awarded more compensation than the $45.75 million provided to it under the Section 177 Agreement for payment of claims during the 15-year period of the Compact. This forced the Tribunal to depart from its policy of making initial payments at the cumulative rate received by previous awardees, as there was simply not enough money to pay out at that level.

In October of 1996, the Tribunal began making initial payments of 25% of each new award. The Tribunal policy in regard to annual payments has evolved to the point where different levels of annual payments are now provided with a lower annual percentage rate being paid to those who received awards before October of 1996 (i.e., those who have received a higher overall proportion of their award) compared to those awarded after that time. As a result, recipients who received awards between 1991 and September 30, 1996, have today received only 63% of their total award; recipients of awards between October 1, 1996, and September 30, 1999, have received 45% payment; and those whose awards have been issued since October 1, 1999, have received 25% payment.

The injustice of this system of payment has become evident only with time. Recipients are denied the full enjoyment of their awards under the annual payment system because the value of the award has decreased as time passes without full payment.

But more unjust is the fact that more and more awardees are denied full payment of their awards because they have passed away. The nuclear testing in the Marshall Islands was conducted between 1946 and 1958. Those who were alive during that period, even if just born, and who have suffered from radiation related disease or other injury are passing away with greater and greater frequency, whether from radiation-related illness or just old age. Of the 1,694 recipients of Tribunal awards, at least 712 (42%) are now deceased.

PROPERTY DAMAGE CLAIMS

Also pending before the Tribunal are many claims for damage to property. The claims for the peoples of Enewetak, Bikini, Rongelap and Utrik are being pursued as class actions and have been given priority over individual land damage claims. The Tribunal has issued its decision in the claim of the people of Enewetak. The claim of the people of Bikini has been submitted to the Tribunal for decision, which will be issued shortly. The claims in Rongelap and Utrik are pending, awaiting a final hearing on their merits. It is the view of the Tribunal that resolution of these class action claims will provide precedent for the determination of the remaining property damage claims.

Establishment of a Radiation Protection Standard

A major category of damage in the class action property claims is cleanup and rehabilitation of the atolls and islands involved. In August 1998, the Tribunal issued an order temporarily consolidating all of the aforementioned class actions in order to address the "common issues of fact and law among these claims in regard to the issue of radiation protection standards for application to costs of cleanup and restoration resulting from . . . contamination by the Nuclear Testing Program."

The Tribunal order also set a formal hearing date in November 1998 to consider establishing a radiation protection standard upon which it would rely in considering claims for such cleanup and rehabilitation of islands and atolls that remain contaminated as a result of the nuclear testing program.

Among the expert witnesses who testified at the November hearing was Mr. Allan Richardson, recently retired Associate Director for Radiation Policy with the U.S. Environmental Protection Agency (EPA). Mr. Richardson provided a copy of a memorandum from EPA clarifying guidance for establishing cleanup levels for radioactive contamination at U.S. sites.[3] The memorandum states that "All remedial actions . . . must be protective of human health and the environment" and that "Cleanup should generally achieve a level of risk within the 10^{-4} and 10^{-6} carcinogenic risk range based on the reasonable maximum exposure for an individual."

The memorandum notes that EPA has determined that the cleanup level of 25 millirem per year established by the U.S. Nuclear Regulatory Commission (NRC) in 1997 (equivalent to approximately 5×10^{-4} increased lifetime risk) with exemptions allowing dose limits of up to 100 millirem (equivalent to 2×10^{-3} increased lifetime risk) "will not provide a protective basis" for remediation.

Claimants also entered into evidence a 1985 document issued by the International Atomic Energy Agency (IAEA) which states "As a basic principle, policies and criteria for radiation protection of populations

3 EPA memo dated Aug 22 1997 entitled "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination"

outside national borders from releases of radioactive substances should be at least as stringent as those for the populations within the country of release."[4]

In December 1998, the Tribunal issued a Memorandum of Decision and Order in which it stated that the IAEA principle "whereby the victims of a transboundary exposure are treated no less favorably than the citizens of the offending country, is consistent with the Tribunal's policy of comparability with U.S. policies and procedures" in its personal injury compensation program. The Tribunal extended that principle to the situation in the Marshall Islands where the U.S. conducted nuclear testing. The Tribunal determined that the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, commonly known as Superfund) governs the cleanup of hazardous waste sites in the U.S. such as the Nevada Test Site and that if the Marshall Islands were in the U.S., both CERCLA and the EPA cleanup guidance standard would apply to them.

The Tribunal Decision concluded by adopting the "policies and criteria" set out in the 1997 EPA memorandum which provides that "If a dose assessment is conducted at the site then 15 millirem per year (mrem/yr) effective dose equivalent (EDE) should generally be the maximum dose limit for humans." That standard will provide the basis on which evidence will be presented to the Tribunal for it to determine the need for and cost of radiological rehabilitation of any atolls where such action may be warranted.

Enewetak Property Damage Award

In April 2000, the Tribunal issued a Memorandum of Decision and Order in the class action property damage claim of the People of Enewetak. In deciding the first property damage claim, the Tribunal stated that "The goal of compensation, where there has been harm to property, should be to make the owner whole through the award of proper damages. A general statement for determination of damages to land may be found at the Restatement (Second) Torts §929, Harm to Land from Past Invasions:

> "(1) If one is entitled to a judgment for harm to land resulting from a past invasion and not amounting to a total destruction of value, the damages include compensation for (a) the difference between the value of the land before the harm and after the harm, or at his election in an appropriate case, the cost of restoration that has been or may be reasonably incurred, (b) the loss of use of the land, and (c) the discomfort and annoyance to him as an occupant."

Restoration and Radiological Cleanup at Enewetak

In considering the various alternatives for radiological cleanup of Enewetak to the established standard that were presented, the Tribunal acknowledged that "Soil removal is a tested technology, and was utilized by the U.S. in Enewetak in past cleanup efforts." Based on the estimated volume of contaminated soil to be removed and replaced (from dredging the lagoon), the Tribunal awarded $22.5 million for this activity. In addition, the Tribunal found that the most effective alternative for disposal of the contaminated soil was to use it to construct a causeway between two islands. The Tribunal stated that such action "more fully protects the residents from risk of harm from exposure to radiation compared to other feasible local disposal options" and awarded $31.5 million for this activity.

4 See IAEA Safety Series No. 67, Assigning a Value to Transboundary Radiation Exposure.

Expert testimony presented to the Tribunal was in agreement that the major pathway of radiation exposure to residents of Enewetak would be ingestion of locally grown foods and that the primary radionuclide of concern was Cesium 137. The Tribunal determined that application of potassium to the soil has been shown to block the uptake of Cs-137 in the atoll's environment. Such treatment, including ongoing monitoring, will be required for approximately 100 years and the Tribunal awarded $15.5 million for this activity. It also awarded $33.8 million for soil rehabilitation and revegetation for a period of up to 50 years until the land is self sustaining.

The Tribunal also found that on Runit, the fifth largest island in the atoll, the residual Plutonium 239 from the tests exceeds the established limit and the island remains quarantined from use. Stating that "Techniques now exist to clean up this plutonium, utilizing soil sorting methods applied at Johnston Atoll," the Tribunal awarded $10 million for that activity. The Tribunal also awarded $4.51 million for characterization surveys to provide information as to the exact location and nature of the contaminated soil to be removed and to ensure compliance with the prescribed cleanup standard.

The gross total awarded by the Tribunal for restoration and cleanup of Enewetak is $117,810,000. In its Decision and Order, however, the Tribunal noted that "This total must be adjusted by the amount of the Enjebi Trust Fund, which the parties stipulated to be $10,000,000." The net total awarded for restoration and cleanup after this deduction is $107,810,000.

Loss of Use of Enewetak

For loss of use, the Tribunal decision acknowledged that "Both the United States and Marshall Islands Constitutions prohibit the taking of private property for public use without just compensation" and noted that "Representatives of the U.S. government committed that the relocated inhabitants of Enewetak would 'be accorded all rights which are normal constitutional rights of citizens under the (U.S.) Constitution.'"

The Tribunal decision referred to a U.S. Supreme Court determination of damages for lost use [Kimball Laundry Co. v United States (1949) 338 US 1] in which it concluded that "the proper measure of such compensation is the rental that probably could have been obtained." In the Enewetak claim, the Tribunal calculated the value of the loss of use by multiplying the relevant annual rental value by the affected acreage and summing these values for the years the use of the land was lost to the owners.

To address that value, the Tribunal relied on a joint appraisal report offered by a team of experts consisting of two appraisal firms, one selected by the claimants and one by the Defender of the Fund. While the appraisers acknowledged that there are circumstances in the Marshall Islands property ownership situation that create challenges to traditional appraisal methods, they also found that the transfer of land use rights for money has gained social acceptance and that from such transfers an analysis of comparables can be conducted on which relevant annual rental values can be based.

The Tribunal decision states that "The period of loss of use had two elements: (1) past loss, which began on December 12, 1947 (the date that the people were relocated from Enewetak to Ujelang) and ran until the date of valuation, and (2) future loss, which began on the date of valuation and continues until such time in the future as the affected property is returned to the people of Enewetak in usable condition, determined by the parties to be 30 years from the effective date of the valuation or May 17, 2026."

Analysis of 174 transactions determined to be comparable to the property at issue resulted in annual rental values ranging from $41 per acre in 1947 to $4,105 per acre in 1996. An adjustment for the deferred nature of the compensation for past loss of use was made by adding an interest component to the rental values, compounded using the average U.S. Treasury 30-year bond rate. Based on the annual rental rates, the affected acreage, and number of years, the rental values for past lost use (including interest) amount to $304,000,000. The Tribunal decision also noted, however, that "These values must be further adjusted for compensation already received by the People of Enewetak." Such compensation included payments made to the people of Enewetak in the amounts of $175,000 in 1956; $1,020,000 in August 1969; $750,000 in September 1976; $750,000 in December 1978; and annual payments of $3,250,000 from 1987 through 1999 pursuant to the Section 177 Agreement. In addition, "In the case of Ujelang, the annualized use value for each year between 1947 and 1980 (when the people returned to Enewetak) is set off against the respective annual loss of use values for Enewetak."

To determine the compensation for future loss of use, the appraisers utilized an income capitalization approach. This method is used to convert a single year's income into an indication of present value by dividing the most current stabilized income by an appropriate rate of return, determined to be eight percent. The calculated value was adjusted downward to reflect the annual $3,250,000 payments to the people of Enewetak under the Section 177 Agreement for 2000 and 2001.

The net adjusted value of the award by the Tribunal for past and future loss of use of Enewetak is $244,000,000.

Hardship Suffered by the People of Enewetak

Extensive and compelling evidence was presented regarding the hardships suffered by the people of Enewetak during their relocation to Ujelang. Conditions there were characterized by famine, near starvation, and death from illness due to the severe limitations of the environment and resources on Ujelang. There were also polio and measles epidemics, an uncontrollable infestation of rats, and infrequent and irregular field trip ship service.

In its decision, the Tribunal stated that "the conditions suffered by those relocated go far beyond simple annoyance." In determining the appropriate amount of compensation, the Tribunal adopted an approach based on an annual amount for each person on Ujelang for each of the 33 years between 1947 and 1980. Recognizing that the period of greatest suffering was from 1956 to 1972, the Tribunal awarded an annual per person amount of $4,500 for each of those 16 years. For the remaining 17 years, preceding and following that period, the annual amount is $3,000. This means that an individual who was present on Ujelang for all 33 years will receive $123,000.

Based on the annual population figures for Ujelang during 1947 to 1980 and the per annum amounts, the damages for hardship amount to $34,084,500.

Summary of Enewetak Award Amounts

The net total of the Tribunal award in the Enewetak claim is $385,894,500.[5] This includes $244,000,000 for past and future loss of use of Enewetak Atoll, $107,810,000 to restore the atoll to a safe and

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[5] This amount reflects adjustments made through post-judgment proceedings.

productive state, and $34,084,500 for the hardships suffered by the people as a result of their relocation to Ujelang.

PROJECTED PAYMENT SCENARIOS

The $150 million Nuclear Claims Fund created under the Section 177 Agreement was expected to produce average annual proceeds of at least $18 million for disbursement in accordance with that Agreement [Article I, Section 2(a)]. Unfortunately, however, due largely to a dramatic drop in October 1987 in the value of the equities in which the Fund had been invested, it became necessary to draw on the corpus of the Fund, rather than the Annual Proceeds, in order to make all of the required disbursements. As a result of the reduced corpus, it became more and more difficult for the Fund to generate $18 million in Annual Proceeds, forcing further invasions of the corpus to meet the disbursement schedule provided for in the Section 177 Agreement.

The effect of this has been to reduce the Fund from its original $150 million to approximately $70 million as of May 2000. Projections on the performance of the Fund during the final 16 months of the Section 177 Agreement indicate that a balance of approximately $50 million may be anticipated in October 2001.

Currently, the Tribunal has awarded more than $72.6 million for personal injuries alone. Payment against those awards totals approximately $40 million. Since the inception of its personal injury compensation program in August 1991, the Tribunal has awarded an average of $689,397 each month. If that trend continues, the Tribunal will have awarded approximately $85.5 million by the end of the Compact period and will have been able to pay only the $45.75 million provided under the Section 177 Agreement, leaving a shortfall of nearly $40 million.

The Agreement provides [at Article II, Section 7(c)] that "commencing on the fifteenth anniversary of the effective date of this Agreement, not less than 75 percent of Annual Proceeds shall be available for disbursement in whole or partial payment of monetary awards made by the Claims Tribunal." Assuming that the value of the Fund at that time (October 2001) is $50 million and assuming an annual return of 10%, the Tribunal will be able to pay $3.75 million per year against outstanding awards. At that rate, even if there are no new personal injury awards made after September 30, 2001, it will take another 10 years for full payment of current personal injury awards to be completed.

If, however, there is provision for the continued operation of the Tribunal and if personal injury awards continue to be made at the past monthly average for another five years, it will take until the year 2023 to make full payment of all personal injury awards at the assumed $3.75 million in annual payment.

A third scenario would be to assume that the annual proceeds of $3.75 million would be applied totally to payment of personal injury awards made through September 2001 (i.e., a projected $85.5 million) and to the property damage award made by the Tribunal for Enewetak Atoll in the amount of $386 million. Such a level of annual proceeds would satisfy the outstanding awards in the amount of $426 million in the year 2115, more than a century from now. Under that scenario, however, there would be no provision for payment of anticipated awards for loss of use, restoration and cleanup, or hardship and consequential damages for the atolls of Bikini, Rongelap or Utrik.

ATTACHMENT 1 - MARSHALL ISLANDS NUCLEAR CLAIMS TRIBUNAL
SUMMARY OF PRESUMED MEDICAL CONDITIONS REGULATIONS

Pursuant to §23(13) of the Marshall Islands Nuclear Claims Tribunal Act, as amended, the Tribunal has adopted regulations establishing a list of medical conditions which are irrebuttably presumed to be the result of the Nuclear Testing Program. For eligible claimants, the administratively presumed medical conditions and the amounts of compensation that will be paid in pro rata annual payments are as follows:

1. Leukemia (other than chronic lymphocytic leukemia....$125,000
2. Cancer of the thyroid
   a. if recurrent or requires multiple surgical and/or ablation 75,000
   b. if non-recurrent or does not require multiple treatment....50,000
3. Cancer of the breast
   a. if recurrent or requires mastectomy....100,000
   b. if non-recurrent or requires lumpectomy....75,000
4. Cancer of the pharynx....100,000
5. Cancer of the esophagus....125,000
6. Cancer of the stomach....125,000
7. Cancer of the small intestine....125,000
8. Cancer of the pancreas....125,000
9. Multiple myeloma....125,000
10. Lymphomas (except Hodgkin's disease)....100,000
11. Cancer of the bile ducts....125,000
12. Cancer of the gall bladder 125,000
13. Cancer of the liver (except if cirrhosis or hepatitis B is indicated) 125,000
14. Cancer of the colon 75,000
15. Cancer of the urinary tract, including the urinary bladder, renal pelves, ureter and urethra 75,000
16. Tumors of the salivary gland
   a. if malignant....50,000
   b. if benign and requiring surgery 37,500
   c. if benign and not requiring surgery....12,500
17. Non-malignant thyroid nodular disease (unless limited to occult nodules)
   a. if requiring total thyroidectomy 50,000
   b. if requiring partial thyroidectomy....37,500
   c. if not requiring thyroidectomy 12,500
18. Cancer of the ovary....125,000
19. Unexplained hypothyroidism (unless thyroiditis indicated)....37,500
20. Severe growth retardation due to thyroid damage....100,000
21. Unexplained bone marrow failure 125,000
22. Meningioma 100,000
23. Radiation sickness diagnosed between June 30, 1946 and August 18, 1958 inclusive 12,500
24. Beta burns diagnosed between June 30, 1946 and August 18, 1958 inclusive 12,500
25. Severe mental retardation (provided born between May and September 1954, inclusive and mother was present on Rongelap or Utirik Atolls at any time in March 1954)....100,000
26. Unexplained hyperparathyroidism....12,500
27. Tumors of the parathyroid gland
   a. if malignant....50,000
   b. if benign and requiring surgery 37,500
   c. if benign and not requiring surgery....12,500
28. Bronchial cancer (including of the lung and pulmonary system)....37,500
29. Tumors of the brain, including schwannomas, but not including other benign neural tumors 125,000
30. Cancer of the central nervous system....125,000
31. Cancer of the kidney 75,000
32. Cancer of the rectum....75,000
33. Cancer of the cecum....75,000
34. Non-melanoma skin cancer in individuals diagnosed as having suffered beta burns under no. 24 above....37,500
35. Cancer of the bone 125,000

To review or obtain copies of the regulations, contact Cathlina deBrum Wakefield, Clerk of the Tribunal, P.O. Box 702, Majuro, MH 96960; telephone (692) 625-3396; facsimile (692) 625-3389; e-mail nctmaj@ntamar.com. <u>(Rev. 2/99)</u>

As detailed herein, injuries and damages resulting from the United States Nuclear Testing Program have arisen, been discovered, or have been adjudicated in the Marshall Islands since the Compact took effect. These injuries and damages could not reasonably have been discovered, or could not have been determined, prior to the effective date of the Compact. Such injuries, damages and adjudication render the terms of the Section 177 Agreement manifestly inadequate to provide just and adequate compensation for injuries to Marshallese people and for damage to or loss of land resulting from the U.S. Nuclear Testing Program.

The terms of Section 177 represent a politically determined settlement (Attachment I, Hills testimony) rather than either a good faith assessment of personal injury or property claims, a legally adjudicated determination of actual damages, or monetary award for such damages. As a political settlement, Section 177 of the Compact requires that the U.S. provide $150 million to the RMI to create a Fund that, over a 15-year period of the Compact, was intended to generate $270 million in proceeds for disbursement "as a means to address past, present and future consequences of the U.S. Nuclear Testing Program, including the resolution of resultant claims" [Preamble of the 177 Agreement].

In lieu of an assessment of damages by the Federal courts, the government of the Marshall Islands accepted the U.S. proposal that it espouse and settle the claims of the Marshallese people arising from the nuclear testing program conducted by the U.S. <u>in</u> conjunction with the establishment of a Claims Tribunal. The U.S. expressly recognized that its technical assessment of radiological damage to persons and property in the RMI was limited to a "best effort" at the time of the Compact (Attachment II, Scientific Analysis), and was based on limited disclosure of available information and incomplete scientific knowledge. As a result, further adjudication of claims by an internal RMI Nuclear Claims Tribunal was agreed to by the United States.

In addition to creating the Tribunal, the U.S. agreed, in exchange for the RMI espousing and settling its citizens claims, to adopt a "Changed Circumstances" procedure, through which Congress accepted the authority and responsibility at a later date to determine the adequacy of the measures adopted under the 177 Agreement to compensate for the injuries and damages caused by the U.S. Nuclear Testing Program. Accordingly, in approving the Section 177 Agreement, Congress accepted the responsibility to determine if further measures are required to provide just and adequate compensation in light of the awards that have been made by the Tribunal, as well as the injuries and damages that have become known or been discovered since the settlement was ratified.

For the RMI to seek and ask for the Congress to provide additional funding is consistent with the commitment of the United States to provide just and adequate compensation for the nuclear claims. Indeed, such funding is contemplated by the Agreement and is the political process intended by Congress as a means to seek just and adequate compensation – if possible without further litigation. Under relevant federal court decisions, it is possible that claims could be recommenced in U.S. courts based on failure of the agreement to provide just and adequate compensation (Attachment III, Legal Analysis).

The settlement specifically authorizes direct access to the Congress of the United States by the RMI if "Changed Circumstances" were discovered or developed after the Agreement took effect, and render the provisions of the Agreement manifestly inadequate. As more knowledge and information emerges about the damages and injuries wrought by the testing program, the manifest inadequacy of Section 177 has become clear. As confirmed in Attachments IV, V, and VI, the most immediate needs resulting from inadequacies of the Agreement are funding to award personal injury claims through the Tribunal, funding to satisfy the Tribunal awards for property damage claims, and funding to address the gross inability of the 177 medical program to effectively address the health consequences of the U.S. Nuclear Testing Program.

Payment of personal injury awards made by the Claims Tribunal
As of August 15, 2000, the Nuclear Claims Tribunal established pursuant to the 177 Agreement had awarded $72,634,750 for personal injuries, an amount $26.9 million more than the $45.75 million total available under Article II, Section 6(c) for payment of all awards, including property damage, over the Compact period. To date, at least 712 of these awardees (42%) have died without receiving their full award (Attachment IV, Decisions of the Nuclear Claims Tribunal).

Payment of property damage awards made by the Claims Tribunal
The Claims Tribunal awarded the Enewetak people compensation for damages they suffered as a result of the U.S. nuclear testing at Enewetak. The compensation included awards for loss of use of their land, for restoration (nuclear cleanup, soil rehabilitation ad revegetation), and for hardship (for suffering the Enewetak people endured while being exiled to Ujelang Atoll for a 33 year period). The Tribunal fully deducted the compensation the Enewetak people received, or are to receive, under the Compact. The Tribunal determined that the net amount of $386 million is required to provide the Enewetak people with the just compensation to which they are entitled. The Tribunal does not have the funds to pay the $386 million award to the Enewetak people (Attachment V, Enewetak Land Claim).

Gross inability of the 177 medical program to effectively address health consequences
One of the measures adopted under the Section 177 Agreement to compensate the people and government of the Marshall Islands was a health care program for four of the atoll populations impacted by the testing program, including those who were downwind of one or more test, and the awardees of personal injury claims from the Tribunal. The medical surveillance and health care program established under the Section 177 Agreement has proven to be manifestly inadequate given the health care needs of the affected communities. The 177 Health Care Program was asked to deliver appropriate health care services within an RMI health infrastructure that was not prepared or equipped to deliver the necessary level of health care. Funding provided under Article II, Section 1(a) of the 177 Agreement has remained at a constant $2 million per year. As a result of this underfunding, the 177 Health Care Program has only $14 per person per month as compared to an average U.S. expenditure of $230 per person per month for similar services (Attachment VI, Medical Analysis).

It is imperative that a new medical program be implemented, with adequate funding that empowers the affected downwind and other exposed communities to provide primary, secondary, and tertiary healthcare for their citizens in a manner compatible and coordinated with RMI and U.S. health care programs and policies.

Based on the inadequacy of funds for personal injury claims, property damage claims, and health consequences from the U.S Nuclear Testing Program, the RMI Government respectfully requests Congress to:

1. Authorize and appropriate $26.9 million so the Claims Tribunal can complete full payment of the personal injury awards made as of August 15, 2000. Of this amount, approximately $21 million is needed to pay off the estates of the 712 individuals known to have died. An additional $5.9 million is needed to make full payments of awards to individuals who are still alive; approximately half of that amount is needed to pay 80 or more individuals who presently suffer from a compensable condition which is likely to result in their death and the remaining half is owed to other living awardees (Attachment IV, Decisions of the Nuclear Claims Tribunal).
2. Authorize and appropriate $386 million to satisfy the Claims Tribunal award to the Enewetak people (Attachment V, Enewetak Land Claim).
3. Authorize and appropriate $50 million in initial capitol costs to build and supply the infrastructure necessary to provide adequate primary and secondary medical care to the populations exposed to radiation from the U.S. Weapons Testing Program (Attachment VI, Medical Analysis).
4. Authorize and appropriate $45 million each year for 50 years for a 177 Health Care Program to provide a health care program for those individuals recognized by the U.S. Government as having been exposed to high levels of radiation during or after the testing program, including those who were downwind for one or more test, and the awardees of personal injury claims from the Tribunal (Attachment VI, Medical Analysis).
5. Extend the U.S. Department of Energy medical monitoring program for exposed populations to any groups that can demonstrate high levels of radiation exposure to the U.S. Congress (Attachment II, Scientific Analysis, issue #6).

Beyond the five immediate changed circumstances, the RMI Government will present information to the U.S. Congress in the future regarding several other areas of changed circumstances. Some of these areas include:

<u>Payment of property damage awards made by the Claims Tribunal</u>
In April 2000, the Claims Tribunal issued its first award for property damage to the people of Enewetak Atoll. The full award of $386 million addresses the claims of the Enewetak people for loss of use of their land, for costs of restoration, and for hardship suffered while in exile for a 33 year period. Additionally, the Claims Tribunal is expected to make an award for property damage to the people of Bikini. Two other property damage claims in the process of being developed include one by Rongelap, Alinginae, and Rongerik and, and one by Utrik, Taka, Tongai/Bokaak. These claims will

be presented to the Tribunal in the near future. The pending cases will better define the level of compensation that will ultimately be required to fully repair damage to all islands, including those not currently being rehabilitated for resettlement, and to provide for adjudication of all other claims.

Funding of environmental rehabilitation and resettlement

The U.S. Congress has recognized the need for environmental restoration to reduce radioactive contamination to acceptable levels at Bikini, Enewetak, and Rongelap atolls by establishing resettlement trust funds for those atolls. The Enewetak trust fund for the rehabilitation and resettlement of Enjebi Island is only $10 million while evidence presented before the Claims Tribunal demonstrated that over $148 million is required for environmental restoration of the atoll and resettlement of a portion of its population, the Enjebi people. Similarly, preliminary estimates for cleanup costs at Bikini and Rongelap atolls (approximately $205-505 million for Bikini Atoll and $100 million for just one island on Rongelap, Rongelap Island) exceed the funding levels currently provided. No rehabilitation and resettlement trust fund presently exists for Utrik.

Support for further medical surveillance and radiological monitoring activities, including tracer chemicals and toxic materials

Under Article II, Section 1 (a) of the 177 Agreement, $3 million was provided to the RMI for medical surveillance and radiological monitoring activities. Those funds were used to conduct a nationwide radiological survey, a medical examination program in the outer islands, and a thyroid study on Ebeye Island. While valuable information was obtained from these activities, such as identification and treatment of radiogenic illnesses, the surveys indicate that thyroid and other radiation related illnesses are evident in populations that are presently unmonitored, yet the funds for medical surveillance are exhausted.

The health consequences of the U.S. Nuclear Testing Program are greater than originally suspected. Additionally, radiation from the testing program reached every corner of the Marshall Islands. Medical surveillance should have been, and should be targeted at monitoring frequencies of all real and potential health consequences of the testing program in a longitudinal fashion. It is only in this manner that a complete understanding of health trends and associations of specific illness and radiation can be appreciated. An onsite national health surveillance system needs to be developed, implemented, and sustained to monitor all health consequences of the nuclear weapons testing program for the next fifty years.

Occupational safety program

Section 177 does not include an occupational safety program for Marshallese and other workers involved in environmental remediation or cleanup programs. As a result, Marshallese and other workers are exposed to occupational sources of radiation. Medical screening of past and present radiation workers is greatly needed to reduce the risk of further illness and claims.

Community education and development programs
Section 177 provides no means to educate Marshallese citizens in radiation related fields or to build local capacity to undertake research, archive relevant information, or educate the public about the consequences of the U.S. Nuclear Testing Program in the Marshall Islands.

Nuclear stewardship program
Section 177 does not provide programs for communities to develop strategies for safely containing radiation and living near radioactive waste storage areas.

The inadequacies presented in this petition "could not reasonably have been identified" in the 177 Agreement [Article IX] both because the full extent of the damages caused by the testing program had never been assessed and because scientific and medical developments since the settlement was consummated would have rendered any prior assessment not just manifestly inadequate, but null and void. What might have been acknowledged by the Government of the United States in 1983 as "damages resulting from the Nuclear Testing Program" is only a small portion of what such injuries and damages are now known to be.

The 67 atomic and thermonuclear weapons detonated in the Marshall Islands allowed the United States Government to achieve its aim of world peace through a deterrence policy. The Marshallese people subsidized this nuclear détente with their lands, health, lives, and future. "As an ally and strategic partner, the Republic of the Marshall Islands has paid a uniquely high price to define its national interest in a manner that also has been compatible with vital U.S. national interests" (H. Con. Res. 92 – Sponsored by the Honorable Benjamin Gilman and the Honorable Don Young). As a strategic partner and friend of the United States, the RMI remains hopeful that Congress will take action to address the inadequacies of the 177 Agreement. The Government of the Republic of the Marshall Islands looks forward to working closely with the Congress of the United States to respond to changed circumstances in the Marshall Islands.

Respectfully submitted,

Kessai H. Note
President
Republic of the Marshall Islands

<u>Attachments</u>:

I	-	Hills Testimony
II	-	Scientific Analysis
III	-	Legal Analysis
IV	-	Decisions of the Nuclear Claims Tribunal
V	-	Enewetak Land Claim
VI	-	Medical Analysis

ATTACHMENT I: HILLS TESTIMONY

HISTORICAL INFORMATION REGARDING
THE MARSHALL ISLANDS NUCLEAR CLAIMS SETTLEMENT
SUBMITTED BY HOWARD L. HILLS*
THE COMMITTEE ON RESOURCES
U.S. HOUSE OF REPRESENTATIVES
MAY 11, 1999

In 1982 President Reagan's Ambassador for Micronesian political status negotiations was instructed, as a result of a National Security Council interagency policy review, to seek the earliest possible termination of the U.N. trusteeship under which the U.S. had administered vast island territories in the mid-Pacific since 1947. This was for reasons the most important of which included the increasingly significant role of the U.S. Army's missile testing range at Kwajalein Atoll in the Marshall Islands in U.S. national security planning and programs.

While the international trusteeship regime gave the U.S. the legal authority to continue its strategic programs in the islands, it also gave the Soviet Union a platform in the Security Council and Trusteeship Council for propagandizing against and attempting to meddle in U.S. national security affairs, including what came to be known as the Strategic Defense Initiative (SDI). These considerations reinforced Reagan Administration determination to end the trusteeship in favor of a treaty-based relationship with a self-governing Republic of the Marshall Islands.

The single greatest obstacle to termination of the trusteeship with respect to the Marshall Islands was the difficult legacy of U.S. nuclear testing program carried out in the Marshall Islands from 1946 to 1958, and the unresolved question of U.S. responsibility for measures to address resulting injuries to persons and damage to lands. Following the establishment of constitutional government in the Marshall Islands, difficult negotiations regarding political status and the nuclear claims issues ensued. Although the final agreements reached in this process were far from perfect and faced criticism on a variety of grounds by national leaders in the RMI and as well as in the United States, the RMI national government ultimately adopted a clear and unequivocal policy in support of the U.S. with respect to trusteeship termination and establishment of a strategic military alliance.

This enabled the U.S. to continue its strategic programs in the RMI, and the RMI achieved national sovereignty. Rather than allowing the nuclear claims issue to persist in a state of legal and political controversy preventing succession of the RMI to separate sovereignty, the RMI entered into a settlement under Section 177 of the Compact in which legal proceedings in U.S. courts were terminated and mechanisms to address the testing claims in the future though bilateral political measures were instituted. The legal effects of this settlement and the intentions of the parties regarding such future measures are discussed below.

After approval of the Compact of Free Association by the U.S. Congress, including the nuclear claims settlement reached under Section 177 of that treaty, the RMI acted in concert with the U.S. in the Security Council, the Trusteeship Council and the General Assembly of the United Nations to sustain and win international acceptance of the measures taken by the U.S. in those bodies terminating the trusteeship. In the face of aggressive and high-visibility efforts led by the Soviet Union to prevent U.N. recognition of the legitimacy of the new status of the RMI and the bilateral relationship between our nations under the Compact, the RMI leadership and their diplomatic representatives stood boldly and unwaveringly with the U.S. in a complex but successful effort to win international acceptance of this new American and RMI strategic alliance.

With the leadership of the RMI a factor critical to our success, the international community soon moved to recognize the relationship defined by the Compact, including the nuclear claims settlement. The U.S. goal of a successful transition from the U.N. trusteeship to a treaty-based bilateral relationship was achieved, and the SDI program activities at Kwajalein were vital to the success of U.S. global strategic policy in the 80's and 90's.

Understanding the Nuclear Claims Settlement

At the time the Reagan Administration undertook its policy review of unresolved issues preventing the termination of the trusteeship, there were strongly held views by some in Congress and the federal agencies concerned that a settlement of claims arising from the testing program was untenable if not impossible. This was due to the fact that the full extent of injuries to persons and damage to property was not yet known and/or not public due to national security classification policies at the time. However, it had become obvious that the measures that had been taken by the U.S. to address the effects of the testing up to that point, including *ex gratia* assistance to the affected peoples as authorized by Congress, were manifestly inadequate.

For example, Congress limited compensation to individuals from four atolls and provided such measures as $25,000. "compassionate payments" for individuals who developed thyroid tumors and had to have these organs removed. Medical treatment was provided by federal agency and contractors, but there were dual treatment and scientific research purposes behind much of these services, and much of the available information about the medical condition of individuals, as well as radiological conditions and related health risks in the islands, remained either classified or unavailable to the islanders in a form they could comprehend.

In the face of these and other troubling circumstances, the Carter Administration had agreed in principle that the U.S. should accept responsibility for the nuclear testing claims and terminate legal claims based on a negotiated political settlement. But an early draft of the Compact initialed by negotiators in 1980 left unanswered the question of how a settlement of claims arising from the testing program was to be structured. The Reagan Administration's policy review confirmed the need to negotiate a nuclear claims settlement based on recognition that the Marshall Islands could not emerge from trusteeship to self-government without replacing the somewhat *ad hoc* measures that had been taken unilaterally by the U.S. up to that point with a more comprehensive program implemented bilaterally.

However, the legal position of the U.S. as represented in court submissions by the Department of Justice was that sovereign immunity, statute of limitations, political question doctrine and other legal defenses precluded U.S. courts from exercising jurisdiction or adjudicating liability in the nuclear claims. Since Congress had never extended U.S. citizenship rights to the islands in any constitutionally binding form, and Congress did not decide to legislatively waive these legal defenses so the cases could be adjudicated in the federal courts, a negotiated bilateral settlement that provided other means to address the claims presented itself as the only available alternative to the somewhat random scheme of *ex gratia* payments previously authorized by Congress in the exercise of its political discretion.

The Carter Administration efforts to come up with a solution were stymied by strong and very explicit Congressional opposition to any settlement that expanded the compensation program beyond the four atolls identified as eligible for *ex gratia* assistance in federal statutes (e.g. P.L. 95-134 and P.L. 96-205). At the same time, leadership of Congressional committees with jurisdiction made it clear that any settlement which ended Congressional authority to determine the adequacy of past, present or future compensation would face committed opposition in the ratification process. To address these concerns, the Reagan Administration proposed to structure the settlement in a manner consistent with existing statutes to the extent practical. In addition, to preserve the residual authority of Congress over these claims a changed circumstances provision was included under which at the request of the RMI the Congress is to consider information and injuries discovered after the settlement enters into force to determine the adequacy of measures implemented under the settlement.

The settlement reached attempted to accommodate the competing forces described above, and was then included in the Compact of Free Association signed by the United States, the Republic of the Marshall Islands, the Federated States of Micronesia and Palau in the 1982-1983 period. The Compact was approved by the U.S. Congress in 1985 and took effect in 1986 (P.L. 99-239). The nuclear claims settlement concluded pursuant to Section 177 of the Compact was expressly incorporated into the Compact, as approved by Congress in the form of a treaty and federal statute law. As reflected in Section 177(b) of U.S. Public Law 99-239, under the final Compact the U.S. agreed to make "provisions for the just and adequate settlement of all claims which have arisen...or which in the future may arise" from the nuclear testing program.

Thus, one way to understand the Section 177 Agreement is as a substitute mechanism to replace the programs instituted by Congress acting unilaterally with a structured process for continuing on a bilateral basis a program of political measures to compensate and address the legacy of the nuclear tests. In accordance with the end of trusteeship status and the termination of U.S. authority over the nationals of the new republic, under this bilateral mechanism the RMI would act as sovereign on behalf of its citizens in carrying out the settlement.

In addition, the settlement provided for a 300% increase over the funding which Congress had previously established for making *ex gratia* payments under a series of statutes cited in Appendix A of the settlement agreement. Specifically, from 1946 to 1980 the *ex gratia* payments Congress had authorized totaled approximately $50 million for support to dislocated communities, scientific and medical programs, and cash payments to individuals. Under the Section 177 Agreement, $150 million was paid to the RMI to finance further compensation and measures through a trust fund established for that purpose.

However, it is imperative to a legally and politically correct understanding of the settlement to recognize that the funding provided under the Section 177 Agreement was not based in whole or in part on an effort to determine actual damages or just compensation for specific injuries or damage to property. Indeed, the amount provided was politically determined based on the level of resources the U.S. offered to establish and sustain the settlement politically in the U.S. and RMI.

If the U.S. Congress or Executive Branch believed that litigation in the federal courts would have resolved the legacy of the nuclear testing program in a satisfactory way, allowing the claimants their "day in court" would have been a more final and terminal solution. However, the decision to continue to address these claims through a political mechanism rather than legal process was based on a belief that litigation brought by Marshallese citizens in the U.S. courts might produce unsatisfactory remedies for the claimants and at the same time reduce or eliminate political support for the establishment of a government-to-government program to address the claims on an on-going basis.

This, however, meant that the RMI and U.S. can and must continually evaluate and determine the adequacy of the political measures being taken to address the effects of the nuclear testing program based on all available knowledge and information, and on the results of the measures already taken. Thus, it would be wrong to conclude that the purpose of the Section 177 was to make the nuclear testing claims "go away" so that the federal government would never have to revisit the question of the adequacy of the measures implemented under the initial terms of the settlement.

To the contrary, the termination of legal process was predicated on continuation of the political determination of the adequacy of the settlement by both the RMI and the U.S. Congress. Indeed, the Preamble of the settlement states that the purpose of the agreement is to "create and maintain, in perpetuity, a means to address past, present and future consequences of the nuclear testing program."

I personally addressed these issues in statements submitted to Congress on behalf of the Reagan Administration during Congressional hearings on the Section 177 Agreement. For example, my statement for the record of the Hearing on S.J. Res. 286, Committee on Energy and Natural Resources, U.S. Senate on May 24, 1984, included the following explanation:

> "...the Marshall Islands Government may seek further assistance from Congress should changed circumstances render the terms of the agreement clearly inadequate...In brief, the Section 177 Agreement does not foreclose further measures for the benefit of the claimants, and they will have access in the future to an impartial claims tribunal for the purposes of obtaining payments in addition to those provided under the agreement. The only requirement is that they be able to prove their claims in accordance with the procedures and standards promulgated by the tribunal in accordance with the Section 177 Agreement."

Thus, the RMI and Congress are faced in 1999 with the same questions they faced in 1982. Are the politically determined measures carried out in lieu of a legal process to adjudicate claims arising from the nuclear testing program adequate legally and morally to sustain the political, economic, and social relationship that exists between the U.S. and the Marshall Islands? Will the existing measures sustain the relationship between our peoples in the future, or do additional measures need to be taken as a result of the information and knowledge gained as a result of our experience under the Section 177 Agreement?

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* From February of 1982 until April of 1986, Howard Hills served as Legal Counsel and Department of Defense Advisor to the President's Personal Representative for Micronesian Status Negotiations. During this period he was assigned to the Office for Micronesian Status Negotiations (OMSN), an interagency office within the National Security Council system responsible for negotiating and representing the Executive Branch in the Congressional approval process for the Compact of Free Association.

Subsequent to approval of the Compact of Free Association, Hills served as Counsel for Interagency Affairs in the State Department's Office for Free Associated State Affairs, Bureau of East Asian and Pacific Affairs. That office was responsible for government-to-government relations under the Compact.

Currently, Mr. Hills has a law practice in Washington D.C. that includes representation of the people of Rongelap regarding their program to resettle their islands in the RMI. Rongelap resettlement is not funded or presently governed under the terms of the Section 177 Agreement.

ATTACHMENT II: SCIENTIFIC ANALYSIS

An Overview of the Technical Basis for Changed Circumstances

By

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ATTACHMENT II: SCIENTIFIC ANALYSIS

An Overview of the Technical Basis for Changed Circumstances

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ATTACHMENT II: SCIENTIFIC ANALYSIS

An Overview of the Technical Basis for Changed Circumstances

At the time of the agreement between the Governments of the United States and the Marshall Islands, the terms of Section 177 primarily represented a political settlement that did not attempt or purport to quantify the magnitude of actual damages nor their monetary values. Any reference to a scientific or factual basis for the terms of the Agreement is limited to Article VIII, which states the following:

"The Government of the United States has concluded that:

(a) The Northern Marshall Islands Radiological Survey and related environmental studies conducted by the Government of the United States represent the best effort of that Government accurately to evaluate and describe radiological conditions in the Marshall Islands; and

(b) The Northern Marshall Islands Radiological survey and related environmental studies have been made available to the Government of the Marshall Islands and can be used for the evaluation of the food chain and environment and estimating radiation-related health consequences of residing in the Northern Marshall Islands after 1978."

Correspondingly, the Government of the United States fully recognized the technical limitations on which the terms of Section 177 were based and had the foresight to make provisions for additional compensation. Accordingly, Article IX of the Agreement contains the following provisions:

"Changed Circumstances

If loss or damage to property and person of the citizens of the Marshall Islands, resulting from the Nuclear Testing Program, arises or is discovered after the effective date of this Agreement, and such injuries were not and could not reasonably have been identified as of the effective date of this Agreement, and if such injuries render the provisions of this Agreement manifestly inadequate, the Government of the Marshall Islands may request that the Government of the United States provide for such injuries by submitting such a request to the Congress of the United States for its consideration. It is understood that this Article does not commit the Congress of the United States to authorize and appropriate funds."

It is clear from Article IX that to validate additional request for monetary compensation pertaining to loss or damage to property and persons, three conditions must be met:

(1) There must be loss or damage which "arises or is discovered after the effective date" of the Agreement;
(2) Such injuries "were not and could not reasonably have been identified" at the time; and
(3) Such injuries render the agreement "manifestly inadequate."

Section 1.0 briefly analyzes the significance and relevance of the Northern Marshall Island Radiological Survey as referenced in Article VIII of the Agreement; and Section 2.0 identifies key issues that satisfy legal requirements of Article IX and define the Government of the Marshall Islands' contention for Changed Circumstances. Owing to the technical complexity that defines each of the issues and their relationship to one another, additional and supportive information is provided in a series of Appendices that follow.

1.0 CHANGED CIRCUMSTANCES PERTAINING TO ARTICLE VIII OF THE AGREEMENT

Article VIII refers to the 1978 Northern Marshall Islands Radiological Survey (NMIRS) as the technical basis for the Compact Agreement. Subsequent to the NMIRS, an enormous amount of additional radiological data has been collected, our understanding of the risks associated with exposure to radiation has changed dramatically, and numerous reports have been published which collectively provide a more complete understanding of the radiological conditions of the Northern Atolls and the potential health risks associated with residual radioactivity. A complete analysis of Article VIII and its impacts on radiation doses and health risks are provided in Appendix A of this petition.

2.0 SCIENTIFIC ISSUES THAT UNDER ARTICLE IX VALIDATE RMI's CONTENTION OF CHANGED CIRCUMSTANCES

The scientific basis for Changed Circumstances can be defined in terms of eight discrete issues that to varying degrees are interrelated. The primary issue that affects nearly all other issues centers around our understanding of radiation health risks as briefly explained below in Issue #1.

Issue #1: New Scientific Understanding of Radiation Health Risks

Since RMI and the U.S. initially reached an agreement on NTP compensation terms, the National Academy of Sciences BEIR V Committee (1990) has asserted that radiation is almost nine times as damaging as estimated by the 1972 BEIR I Committee.

At the time of the initial Agreement, "what was understood" by the scientific community pertaining to radiation health risks was principally defined by the National Academy of Sciences (NAS) Committee on the biological effects of ionizing radiation or BEIR I Report issued in 1972. Radiation health risks defined in BEIR I were primarily based on early data concerning the disease and mortality outcome of the Japanese A-bomb survivors. Subsequent data from the Japanese A-bomb life-span study and other studies led to revised estimates of radiation-induced health risks. In summary, since the time of the Agreement, scientists have learned that for a given dose of radiation, the risk of cancer and other radiation-induced health effects is about nine times greater than previously thought. Appendix B of this petition provides a more detailed explanation regarding revision in our understanding of radiation health risks. Also relevant are recently published data that identify health effects that at the time of the Agreement had not even been identified as being radiation induced (see Appendix C).

Issue #2: Revised Radiation Dose Standards for Members of the Public

Consistent with our revised understanding of radiation health risks (i.e., the nine-fold increase in risk per unit dose of radiation as discussed above), there has been a steady reduction in the dose limit for members of the public. At the time of the Agreement, the dose limit to a member of the public was 500 mrem per year. Motivated by the increased awareness of radiation health risks, valuation of human life/health, and technological advances, dose limits have been incrementally reduced since the time of the Agreement. The current dose limit and cleanup criteria specified by the EPA and adopted by the Nuclear Claims Tribunal is 15 mrem per year (see Appendix D).

Issue #3: Unexpected Radiation Injury Claims Requiring Compensation

Through August 15, 2000, the Nuclear Claims Tribunal had awarded in excess of $72,634,750 million in compensation for personal injuries. This amount exceeds by $26.9 million the $45.75 million that had been made available to the Tribunal under the Section 177 Agreement for payment of awards relating to loss or damage to property and persons.

Because of this shortfall of available funds, at least 712 (42%) of awardees have died prior to receiving full payment of compensation awarded for their personal radiation injury claims.

It is a matter of record that (1) no scientific analysis had ever been undertaken by the U.S. Government to assess and quantify future radiation health effects that might be expected from exposure and (2) no determination was made that assessed the adequacy of the $45.75 million that was appropriated for claims relating to loss or damage to property and persons. Thus, the appropriated sum of $45.75 million made available to the Tribunal under the Section 177 Agreement for payment of awards relating to loss or damage to property and persons is without technical basis and, due to the fact that over $72 million have already been awarded, it is manifestly inadequate. Appendix F provides additional information regarding this issue.

Issue #4: Revised Radiation Dose Estimates and Past Exposure to Toxic Chemicals

Other factors that are likely to have contributed to the unexpected number of personal radiation injury claims (i.e., Issue #4) and comply with criteria for Changed Circumstances include the following:

(1) A recent study conducted by independent scientists (Behling et al. 2000) has provided compelling evidence that previously cited acute doses associated with BRAVO fallout have been grossly underestimated (see Appendix G). The study shows that past estimates of thyroid doses to residents of Rongelap and Utrik have been underestimated by 10- to 20-fold; whole body doses from external radiation are more than two-fold higher than previously estimated; and internal exposure to tissues other than the thyroid that were previously dismissed as "insignificant" resulted in doses of hundreds of rads.

(2) In 1999, DOE acknowledged for the first time its use of toxic/radioactive tracers as part of its nuclear testing program (see Appendix H). Their potential adverse effects on human health and the environment (past and present) have yet to be determined.

Issue #5: The Increased Cost of Cleanup That Could Not Reasonably Have Been Identified at Time of Agreement

As discussed in behalf of Issue #2, the dose criterion for cleanup was reduced by more than thirty-fold since the time of the Agreement. Thus, the consequence of reducing the initial dose cleanup criteria from 500 mrem per year to the current cleanup standard of 15 mrem per year has the obvious effect of demanding a greater cleanup effort that comes at a significantly greater cost. This clearly renders the level of compensation for the restoration of contaminated lands provided under the Section 177 Agreement "manifestly inadequate."

A second and equally compelling contribution to Changed Circumstances that relates to cleanup costs is the simple fact that at time of the Agreement, very little if any data existed that could have provided a technical basis for estimating such cleanup costs. Scientific studies performed under contract to the local governments of Enewetak and Bikini and presented to the Nuclear Claims Tribunal in 1999 have made use of data that have only recently become available. Not surprisingly, these studies cite cost estimates that are several times higher than monies that had been appropriated for cleanup and restoration under the Agreement.

Appendix E expands on this issue and provides a brief chronology for the evolution of cleanup regulations, applicable remediation technologies, and essential cost data that have been made available in recent years but were not available at time of the Agreement.

Issue #6: Higher Cost for Medical Health Care, Medical Surveillance, and Radiological Monitoring and the Need to Include the Inhabitants of Ailuk Atoll

The higher costs associated with health care, medical surveillance, and radiological monitoring of Marshallese citizens who had been affected by the Nuclear Testing Program could not reasonably have been identified at time of the Agreement. This is due to a combination of factors that are embedded in Issues #1, #2, and #3, as described above. In addition, there is a critical need to include inhabitants of Ailuk under the health care programs that specifically address consequences of the Nuclear Testing Program. Under the Agreement, these programs are currently restricted to persons of Bikini, Enewetak, Rongelap, and Utrik. To summarize, the following are key factors contributing to medical costs that could not have been anticipated:

a. revised radiation risk coefficients that raise the observed/future number of radiogenic cancers about nine-fold.

b. new data related to radiation health effects that had previously not been considered. Included are new study data pertaining to the radio-sensitivity of thyroids during infancy/early childhood.

c. larger internal doses to thyroid and other tissues and external whole body doses from BRAVO fallout than were previously estimated by the DOE.

d. a larger number of exposed persons than was previously acknowledged. To be included among highly exposed individuals are inhabitants of Ailuk who were present at time of BRAVO. Preliminary data indicate that persons on Ailuk were exposed to BRAVO fallout that resulted in internal and external doses that at minimum were comparable to radiation doses received by residents at Utrik (see Appendix I).

Issue #7: Exposure of Kwajalein

A review of recently declassified documents has revealed that, in addition to the northern atolls, other atolls, previously considered to be relatively unaffected by fallout, were found to have experienced significant levels of fallout and radiation exposures well in excess of the radiation protection standards at that time. For example, a reconstruction of the radiation doses on Kwajalein from 1954 to 1956, using fallout data collected with gummed paper, along with conventional radiation surveillance data, revealed that the people of Kwajalen experienced elevated levels of fallout following each test, and that these exposures resulted in doses of about 2.9 rem over the three year period. This represents an average dose of well in excess of 500 mrem/yr which was the radiation protection standard at that time. Scientific advisors are continuing to achieve a better understanding of the magnitude and extent of exposures to fallout not only on the northern atolls but throughout the Marshall Islands. New information about exposure warrants an extension of the medical surveillance program to additional atoll communities.

Issue #8: Declassification of DOE Records

As part of its "Openness Initiative" the DOE began to declassify a large body of information in the early 1990s. Included are records pertaining to the nuclear testing program in the Marshall Islands. Information made available to date represents a total of 77 file boxes.

A preliminary review of their contents has revealed a wealth of critical information that confirms and supports Changed Circumstances. An example of the impact of data declassification is provided in Appendix J.

3.0 CONCLUDING REMARKS

It is an understatement to say that the U.S. greatly benefitted from the Nuclear Testing Program in the Marshall Islands during the Cold War era in terms of testing and experimentation with nuclear weapons and the effects of radiation from weapons on biological systems and the environment. In addition to promoting U.S. national security in the Cold War era, the NTP was critical to prevention of nuclear conflict and contributed directly to ending the Cold War with the result that the U.S. currently is the only remaining world superpower. Unfortunately, the benefits of this testing program came at a price. Over the years, the quality of life for many Marshallese has been adversely affected by a variety of radiation induced cancers and other health effects. Even for those spared the suffering of health effects, their quality of life has been compromised by years of exile and denied use of their homelands, the constant fear of living with residual radioactivity that persists in their environment and within their bodies, and the potential for radiation health effects that have yet to manifest themselves.

From data presented herein, it is clear that the state of knowledge about radiological conditions in the Marshall Islands and the effects of those conditions on its citizens were neither adequately known nor could have been reasonably identified at the time of the Section 177 Agreement. Indeed, it was this awareness that prompted the provision of Changed Circumstances in Article IX of the Section 177 Agreement.

It should not surprise anyone that the Marshall Islands will put forward a formal request for additional compensation under Article IX of the Section 177 Agreement. Such action was fully contemplated under that Agreement by U.S. officials if credible evidence came to light to demonstrate that the definition of affected atolls and people was too restricted or that there were injuries, loss, or damage that could not have been reasonably anticipated and provided for in the Agreement.

The Republic of the Marshall Islands believes that the evidence contained in this report is of sufficient credibility to demonstrate that the loss or damage was discovered after the effective date of the Section 177 Agreement, that the extent of such damages and injuries were not known or foreseeable, and that those damages and injuries render the Agreement manifestly inadequate and warrant invoking of Article IX by the Government of the Republic of the Marshall Islands.

APPENDIX A

CHANGED CIRCUMSTANCES PERTAINING TO ARTICLE VIII OF THE COMPACT

Article VIII refers to the 1978 Northern Marshall Islands Radiological Survey (NMIRS) as the technical basis for the Compact Agreement. Subsequent to the NMIRS, an enormous amount of additional radiological data has been collected, our understanding of the risks associated with exposure to radiation has changed dramatically, and numerous major reports have been published which provide a more complete understanding of the radiological conditions on many of the Northern Atolls and the potential health risks associated with residual radioactivity in the environment. Further, the radiation protection standards have become over 30-fold more restrictive since the NMIRS. The overall effect of these changed circumstances is the cost of cleanup to currently acceptable levels is much greater than ever anticipated at the time of the original agreement and could therefore not have been foreseen.

Article VIII of the Compact refers to the Northern Marshall Islands Radiological Survey (NMIRS), as represented in the following document, as the technical basis for the agreement:

> *The Meaning of Radiation for those Atolls in the Northern Part of the Marshall Islands that Were Surveyed in 1978*, United States Department of Energy, Washington, D.C., November 1982.

That report also incorporates, by reference, two additional reports entitled:

> "The Enewetak Atoll Today" and
>
> "The Meaning of Radiation at Bikini Atoll"

Together, these reports define what was understood at that time regarding:

1. The nature and extent of radioactive contamination on the Northern Atolls,
2. The potential levels of radiation exposure and the associated health risks that may be experienced by the Marshallese due to residual radioactivity in the environment, and
3. The radiation protection standards in effect at that time.

In the sections that follow, changed circumstances are reviewed from each of these three perspectives.

The Nature and Extent of Radioactive Contamination on the Northern Atolls

Results of the NMIRS, which was performed from September through November of 1978, are presented in several reports. However, the most comprehensive and widely distributed of these reports is the following:

> Robison, W.L., *The Northern Marshall Islands Radiological Survey: Data and Dose Assessments*, Health Physics, Vol 73, No. 1, p. 37-48, July 1997.

This report includes results of the radiation gamma surveys and radiological analysis of 5435 samples of water, soil, sediment, and biota collected on 91 islands from 14 atolls. Periodically since 1978, and continuing today, Lawrence Livermore National Laboratory, under the direction of Dr. William Robison, has performed additional radiological surveys of the Northern Marshall Islands. In addition, in the first half of the 1990s, the Nationwide Radiological Study, under the direction of Dr. Steven Simon, performed radiological surveys of every atoll in the Marshall Islands and included over 400 islands. These investigations have increased our understanding of the extent of the radioactive contamination throughout the Marshall Islands. To date, we have reviewed the surveys performed on Enewetak, Bikini, Rongelap, Rongerik, and Ailinginae Atolls. Table A-1 summarizes the results of that review with respect to the number of soil samples collected and analyzed:

Table A-1. Soil Characterization Data

Atoll	Radiological Surveys Performed as part of the NMIRS in 1978 (No. of soil samples) [1]	Radiological Surveys Performed Subsequent to 1978 (No. of soil samples)
Bikini	891	420 (Simon 1993) [4] 1504 (Robison post 1979) [2]
Enewetak	6 [7]	507 (Robison 1984 B1996) [2] 171 (Simon 1991-1992) [5]
Rongerik	161	110 (Simon 1992) [3]
Rongelap	398	324 (Robison 1986 to 1993) [2] 213 (Simon 1994) [6]
Ailinginae	225	167 (Simon 1992) [3]

1. From Robison, 1997, Health Physics, Vol 73, No. 1, p. 37-48, July 1997
2. From database provided by LLNL
3. From Simon and Graham, RMI Radiological Survey of Rongerik and Ailinginae Atolls, February 1995
4. From Simon and Graham, RMI Radiological Survey of Bikini Atoll, February 1995
5. From Simon and Graham, RMI Radiological Survey of Enewetak and Ujelang, February 1995
6. From Findings of the Rongelap Resettlement Project Scientific Studies, by K.F. Baverstock, B. Franke, and S.L. Simon, January 1995.
7. In 1979, the Nevada Operations Office of the Department of Energy collected samples of soil at 1011 locations on Enewetak Atoll and published the results in NVO-213, September 1982. These data, which are referred to as the Fission Product Data Base, are not part of the NMIRS, but likely contributed to our understanding of the contamination at that time.

As may be noted, surveys performed subsequent to the NMIRS have significantly increased the amount of data characterizing the radiological conditions on many atolls. This applies not only to soil samples, but also to external gamma radiation and samples of food, water, and air. In addition, numerous reports have been published that analyze and interpret these data with respect to radiation doses and risks and cleanup strategies.

Our review of these data reveals that the contamination is depleting from the environment very slowly, and that, from a practical perspective, we can reasonably assume that Cs-137 in soil and food crops has been depleted from the environment by radioactive decay alone. The implication of this relatively new finding is that "natural removal" by such mechanisms as weathering, erosion, and leaching is not a plausible remediation alternative.

Potential Levels of Radiation Exposure and Associated Health Risks

Reports cited in the Compact Agreement also include estimates of the radiation doses and potential health risks to the Marshallese due to residual radioactivity in the environment. These estimates were based not only on radionuclide levels in the environment but also on an understanding of the lifestyle of the Marshallese (primarily diet), radiation dosimetry models, and the radiation health risk coefficients at the time of the Agreement. Recently, the Local Government Councils of several of the northern atolls have completed new studies that reassessed radiation doses and health risks for several of the atolls using more current information. In this section, we present the radiation doses and health risks as reported in the 1978 reports and compare them to the radiation doses and health risks as currently estimated by the Local Government Councils for Enewetak, Bikini, Rongelap, Rongerik and Ailinginae. Table A-3 presents a comparison of past and current radiation doses and health risks.

Table A-2. Comparison of Doses and Risks

Atoll	Radiation Doses		Health Impacts	
	Dose to high end individuals (mrem/yr whole body)		Time-integrated collective health detriment (total number of cancers)	
	NMIRS (1978)**	Update (2005)	NMIRS (1978)	Update (2005)
Bikini Atoll				100
Eneu	419	451	up to 3	
Bikini	3329	3889	up to 22	
Enewetak	* (See Table A-3 below)	18 Enewetak 1355 Enjebi	*	10
Rongerik	145	up to 129	up to 0.2	up to 2
Rongelap	215	190	up to 0.6	up to 56
Ailinginae	145	up to 45	up to 0.2	up to 2
Wotho Island	16	NC	up to 0.01	NC
Likiep	40	NC	up to 0.2	NC
Taka	11	NC	up to 0.01	NC
Jemo	37	NC	up to 0.03	NC
Utrik	40	NC	up to 0.2	NC
Bikar	113	NC	up to 0.2	NC
Ailuk	48	NC	up to 0.2	NC
Mejit Island	54	NC	up to 0.2	NC
Ujelang Island	11	NC	up to 0.01	NC

* The Enewetak report presents its results in a different form, as described below.
** All values are decay corrected to 2005 in order to facilitate a comparison.
NC = Not Calculated

After correcting for natural radioactive decay, high-end doses derived in 1978 are generally in agreement with current values for the five atolls. However, updated estimates of collective health detriment are much higher than estimates previously provided in the NMIRS reports. The primary reasons for the differences are due to the fact that 1978 estimates were based on smaller projected populations and shorter time periods for exposure (i.e., 30 years). The updated estimates take into consideration recent estimates of the population growth rate, time integration periods extending 1000 years into the future, the assumption that eventually most of the population would return to traditional lifestyles (which includes diets consisting predominantly of locally grown foods), and the possibility that large portions of the atolls would be dedicated to the production of copra. Another contribution to differences is that the 1978 estimates of health detriment were based on radiation risk coefficients recommended by the National Academy of

Sciences (NAS) in 1972, while the current estimates of health detriment employed risk coefficients recommended by the EPA in Federal Guidance Report No 13 dated 1998[1] and EPA 1994[2]. Within this time period, the risk coefficients have increased several fold. The updated estimates of potential collective health detriment, therefore, represent a substantial change in our understanding of impacts due to residual radioactivity in the environment.

A second report entitled "The Enewetak Atoll Today" dated 1979 presents similar estimates of individual doses and lifetime health risks for various islands of Enewetak Atoll as they were understood at that time. Table A-3 compares the results of the 1979 NMIRS investigations with those recently prepared for the People of Enewetak.

Table A-3. High-End Doses and 30-Year Cancer Risk on Enewetak
(local food only and no food banks)

Island	NMIRS		Recent Update	
	mrem/yr in 1978	Increase risk of cancer relative to normal incidence	mrem/yr in 2010	Increase risk of Cancer relative to normal incidence
Enewetak	24	9.0e-04	18	2.0e-03
Medren	24	9.0e-04	21	2.3e-03
Japtan	24	9.0e-04	31	3.5e-03
Bijire	294	8.8e-03	247	2.8e-02
Aomon	294	8.8e-03	242	2.7e-02
Enjebi	2010	4.4e-02	1355	1.5e-01

Consistent with previous data for other atolls, radiation doses for islands of Enewetak derived in 1978 and those derived more recently compare reasonably well (within a factor of two) when radioactive decay is taken into consideration. However, the more recent analysis presents lifetime health risks that are about 3 to 4 times higher. The increase is due primarily to the increased value of the radiation risk coefficients as noted previously.

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1 EPA 1998, Health Risks from Low-Level Environmental Exposure to Radionuclides, Federal Guidance Report No. 13, EPA 402-R-97-014, January 1998.

2 EPA 1994, Estimating Radiogenic Cancer Risks, EPA 402-R-93-076, June 1994.

APPENDIX B

NEW SCIENTIFIC UNDERSTANDING OF RADIATION HEALTH RISKS

Since RMI and the U.S. initially reached an agreement on NTP compensation terms, the National Academy of Sciences BEIR V Committee (1990) has asserted that radiation is almost nine times as damaging as estimated by the 1972 BEIR I Committee. This scientific revision to our knowledge base could have neither been predicted nor foreseen.

The end of World War II was marked by the use of two nuclear weapons dropped over Japan in August 1945. Initial studies of the Japanese survivors of Hiroshima and Nagasaki were concerned primarily with the immediate clinical effects of radiation, as well as blast and other acute effects. In 1947, the National Academy of Sciences (NAS) formed a committee and, with AEC funding, began a long-range study of nearly 100,000 survivors of the Hiroshima and Nagasaki bombings. The National Academy of Sciences formed a committee in 1956 to review the biological effects of atomic radiation (BEAR). This and succeeding NAS Committees have issued a series of reports on the biological effects of ionizing radiation (BEIR). The first or BEIR I Committee Report was issued in 1972 and was followed by BEIR III in 1980 and BEIR V reports in 1990. For risk estimates, each of these reports relied heavily on the every-expanding disease and mortality data base of the Japanese life-span stud (LSS) that continues today.

In short, since the issuance of BEIR I report, scientists have substantially revised their understanding of the dose-response relationship that provides a quantitative measure of radiation health risks.

BEIR I was the Basis for the Section 177 Agreement

At the time of the initial Agreement, "what was understood" by the scientific community pertaining to radiation health risks was, therefore, principally defined by BEIR I. Data from the Japanese A-bomb life-span study, however, was far from complete and dose-response models had been employed in BEIR I that in subsequent years were considered inconsistent with newly emerging data. This led to the 1980 BEIR III Committee Report, which used a "linear-quadratic" (or curvilinear) dose-response model that the NAS Committee felt to be more consistent with the newly available epidemiological and radiobiologic data.

It should be noted that the acceptance of this curvilinear dose-response relationship adopted by BEIR III was not unanimous. According to this model, the relationship between radiation dose and cancer suggested a dose-response in which lower doses of radiation had been assumed to result in a lower rate of cancer per unit dose than for higher doses. Dr. Edward P. Radford, Chairman of the BEIR III Committee, had dissented from that conclusion and filed a statement that argued for a straight line or linear relationship between dose and risk.

In 1990, the National Academy of Sciences issued its BEIR V report. Based on new evidence, Dr. Radford's earlier recommendation to employ a linear dose-response model was accepted. In addition, this Committee accepted significant revisions to what had previously been assumed to have been the radiation doses to the exposed Japanese A-bomb survivors. In the Executive Summary of the BEIR V Report, the Committee stated:

> "The cancer risk estimates derived with the preferred models used in this report are about 3 times larger for solid cancers (relative risk projection) and about 4 times larger for leukemia than the risk estimates presented in the BEIR III report. These differences result from a number of factors, including new risk models, revised A-bomb dosimetry, and extended follow-up of A-bomb survivors. . ."

The nearly nine-fold higher current estimates of radiation health risk since the time of BEIR I and the initial draft agreement of Section 177 have been acknowledged by the Scientific Community at large as well as the DOE. The BEIR V Committee assumed with respect to cancer induction and hereditary genetic effects that the frequency of such effects increases low-level radiation as a linear nonthreshold function of the radiation dose. (The Committee thereby acknowledged Dr. Radford's previous opinion of an increased low-dose risk defined by a straight-line dose response relationship.) Under the BEIR V model, a single acute exposure to 10 rem of whole body external gamma radiation is projected to yield eight (8) excess fatal cancers per 1,000 people; and continuous lifetime exposure to 0.1 rem (or 100 mrem) per year would lead to an excess of 5 to 6 additional cancers per 1,000 people. It should also be noted that the BEIR V Committee's adoption of a relative risk model eliminated restrictions on latency periods that may pass before radiogenic conditions may manifest in persons many years after an exposure.

The revision in risk coefficients over the past 20 years has been fully acknowledged by the DOE. In a 1995 DOE Publication: *Closing the Circle on the Splitting of the Atom*, the following statement appears:

> . . The National Academy of Sciences BEIR V report asserts that radiation is almost nine times as damaging as estimated in BEIR I."

BEIR VII Phase-2 Study: Upcoming Risk Estimates that Reflect the Most Current Scientific Data

The U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, asked the National Research Council to evaluate whether sufficient new data exist to warrant yet another reassessment of health risks that would update BEIR V (1990). In response to this request, the National Research Council assembled the Committee on Health Risks of Exposure to Low Levels of Ionizing Radiations. The work of the committee was conducted in what was called the BEIR VII phase-1 study. To assist the committee during its deliberations, various scientists were consulted for advice, and a workshop on the impact of biology on risk assessment was held in collaboration with the Department of Energy, Office of

Health and Environmental Research. The intent of the workshop was to address the implications of new understanding of the biologic basis of radiation injury and carcinogenesis for risk assessment.

The following is a synopsis of the conclusions stated in the BEIR VII phase-1 study:

> "Information that has become available since the 1990 publication of *Health Effects of Exposure to Low Levels of Ionizing Radiations (BEIR V)* makes this an opportune time to proceed with BEIR VII phase-2, a comprehensive reanalysis of health risks associated with low levels of ionizing radiations. Such a study should begin as soon as possible and is expected to take about 36 months to complete."

Table B-1 is a summary of the more important epidemiologic data that have been published since the 1990 publication of the BEIR V Report or that is expected to provide new and useful data during the 3-year term of the proposed BEIR VII phase-2 study. Although not exhaustive, the list should serve as a guide to some of the pertinent new and upcoming epidemiologic data on the subject.

Table B-1. Summary of Epidemiologic Studies of Low Linear Energy Transfer Ionizing Radiation and Cancer Since BEIR V, 1990

Study	Reference	Type of Study	Series	Sex	No. in Study	Follow-up Period	Cancer Sites Reported
Ankylosing spondylitis patients	Weiss and others, 1994	Cohort	Mortality	Male & Female	15,777	1935-1992	All cancer and multiple cancer sites.
	Weiss and others, 1995	Cohort	Mortality	Male & Female	14,767	1935-1992	Leukemia
Atomic-bomb survivors	Preston and others, 1994	Cohort	Incidence	Male & Female	93,696	1950-1987	Leukemia, lymphoma, multiple myeloma
	Thompson and others, 1994	Cohort	Incidence	Male & Female	79,972	1958-1987	Multiple cancer sites (solid tumors)
	Ron and others, 1995a	Cohort	Incidence	Male & Female	80,311	1958-1989	Benign tumors of stomach, colon, and rectum
Atomic-bomb survivors	Pierce and others, 1996	Cohort	Mortality	Male & Female	86,572	1950-1990	Non leukemias, leukemia, and multiple cancer sites
Atomic-bomb survivors	Land and others, 1994a Land and others, 1994b	Case control		Female	Cases: 196 Controls: 566	1955-1981	Breast cancer
Atomic-bomb survivors (in utero cohorts)	Delongchamp and others, 1997	Cohort	Mortality	Male & Female	17,601	1950-1992	Non leukemias, leukemia, and multiple cancer sites
Canadian fluoroscopy	Howe, 1995	Cohort	Mortality	Male & Female	64,172	1950-1987	Lung cancer
	Howe and McLaughlin, 1996	Cohort	Mortality	Male & Female	31,917	1980-1987	Breast cancer
Cervical cancer patients	Klinermqan and others, 1995	Cohort	Incidence	Female	86,193	1935-1990	Multiple cancer sites
Contralateral breast (Denmark)	Storm and others, 1992	Case control in cohort		Female	Cohort: 56,540 Cases: 691 Controls: 691	1943-1986	Breast cancer

Contralateral breast (US)	Boice and others, 1992	Case control in cohort		Female	Cohort: 4,109 Cases:655 Controls: 1,189	1935-1987	Breast cancer
Fallout from Nevada Test Site	Kerber and others, 1993	Cohort	Incidence	Male & Female	2,473	1965-1986	Thyroid cancer and other thyroid disease
	Simon and others, 1995	Case control		Male & Female	Cases: 1,177 Controls: 5,330	1952-1981	Leukemia
Massachusetts fluoroscopy	Davis and others, 1989	Cohort	Mortality	Male & Female	13,385	1929-1986	Multiple cancer sites
	Boice and others, 1991	Cohort	Incidence	Female	4,940	1925-1986	Breast cancer
Multiple diagnostic x-rays of scoliosis patients	Hoffman and others, 1989	Cohort	Incidence	Female	1,030	1935-1986	Breast cancer
Nuclear industry workers (combined analysis)	Cardis and others, 1994	Cohort	Mortality	Male & Female	95,673	1943-1988	Multiple cancer sites
	Cardis and others, 1995	Cohort	Mortality	Male & Female	95,673	1943-1988	Solid tumors and leukemia
Nuclear workers at Mayak Production Association	Koshurnikova and Shilnikova, 1996	Cohort	Mortality	Male & Female	18,879	1948-1993	Lung cancer and leukemia
Pelvic radiotherapy for benign gynecologic disease	Inskip and others, 1993	Cohort	Mortality	Female	12,955	1929-1985	Multiple hematopoietic cancers
Pooled analysis of external radiation and thyroid cancer	Ron and others, 1995 b	Cohort Case control	Incidence	Male & Female	120,000	1926-1990	Thyroid cancer

Radiation treatment for benign head and neck conditions (benign thyroid tumors)	Wong and others, 1996	Cohort	Incidence	Male & Female	544	1939-1991	Benign thyroid nodules
Radiation treatment for benign head and neck conditions (thyroid cancer and thyroid nodules)	Schneider and others, 1993	Cohort	Incidence	Male & Female	4,296	1939-1990	Thyroid cancer and nodules
Radiation treatment for breast cancer	Curtis and others, 1992	Case control in cohort		Female	Cohort: 82,700 Cases: 90 Controls: 264	1973-1985	Leukemia
Radiation treatment for peptic ulcer	Griem and others, 1994	Cohort	Mortality	Male & Female	3,609	1937-1985	Multiple cancer sites
Radiotherapy for Hodgkin disease (breast cancer)	Hancock and others, 1993	Cohort	Incidence & Mortality	Female	885	1961-1990	Breast cancer
Radiotherapy for Hodgkin Disease (gastrointestinal cancer)	Birdwell and others, 1994	Cohort	Incidence and Mortality	Male & Female	2,441	1961-1993	Multiple cancer sites (gastro-intestinal only)
Radiotherapy for metropathia hemorrhagic anemia	Darby and others, 1994	Cohort	Mortality	Female	2,067	1940-1991	Multiple cancer sites
Radiotherapy for pituitary adenoma	Brada and others, 1992	Cohort	Incidence	Male & Female	334	1962-1986	Multiple cancer sites (solid tumors)
Radiotherapy for skin, hemangioma in childhood	Furst and others, 1990	Case control in cohort		Male & Female	Cohort: 14,647 Cases: 94 Controls: 359	1920-1986	Multiple cancer sites (solid tumors)

Radiotherapy for thymus enlargement	Shore, 1990	Cohort	Incidence	Male & Female	7,450	1953-1989	Skin cancer
Radiotherapy for uterine bleeding	Inskip and others, 1990	Cohort	Mortality	Female	4,153	1925-1984	Multiple cancer sites
Tinea capitis (Israel)	Ron and others, 1989	Cohort	Incidence	Male & Female	10,834	1950-1986	Thyroid cancer and other thyroid disease
	Ron and others, 1991	Cohort	Incidence	Male & Female	27,060	1950-1980	Melanoma, other skin cancer and benign skin tumors
Women treated for infertility	Ron and others, 1994	Cohort	Mortality	Female	816	1925-1991	Multiple cancer sites

Study	Reference	Description
In utero exposure	Doll and Wakeford, 1997	A review of case-control and cohort studies of childhood cancers.

APPENDIX C

NEW SCIENTIFIC UNDERSTANDING OF RADIATION HEALTH EFFECTS PREVIOUSLY NOT KNOWN

There is new evidence of radiation induced health effects that has previously never been identified/considered.

Of the various types of health effects that may result from low-dose radiation, cancer induction and gene mutation remain the best documented. However, as new data are analyzed, a stronger causal relationship between radiation exposure and other health effects have been noted that were previously (i.e., BEIR III) not evident.

For example, the frequency of severe mental retardation in Japanese A-bomb survivors exposed at 8-15 weeks of gestational age has been found to increase more steeply with dose than was expected at the time of the BEIR III report. The data now reveal the magnitude of this risk to be approximately a 4% chance of occurrence per 0.1 Sv (i.e., 10 rem), but with less risk occurring for exposures at other gestational ages. Although the data do not suffice to define precisely the shape of the dose-effect curve, they imply that there may be little, if any, threshold for the effect when the brain is in its most sensitive stage of development. The BEIR V Committee provided the following caution:

> "Pending further information, the risk of this type of injury to the developing embryo must not be overlooked in assessing the health implications of low-level exposure for women of childbearing age."

Summary. Table C-1 provides a summary of findings to date that include firmly established radiation health effects as well as some that to date have only been suggestive of being radiation related. Several of these health effects had not been recognized at time of the NTP Agreement.

Table C-1. A Summary of the Findings to Date

Significant Radiation-Related Increase
Malignant tumors; leukemia, cancers of the breast (female), colon, liver, lung, ovary, skin (nonmelanoma), stomach and thyroid
Lenticular opacities
Small head size, mental retardation, diminished IQ and school performance, increased frequency of seizures (prenatally exposed)
Retarded growth and development (among survivors exposed at young age or prenatally)
Chromosome Abnormalities in lymphocytes
Somatic mutation in erythrocytes and lymphocytes
Suggestive Radiation-Related Increase
Malignant tumors; cancer of the esophagus and urinary bladder, malignant lymphoma, salivary gland tumors, and possibly, multiple myeloma
Adult-type malignancies among the prenatally exposed
Impairment of neuromuscular development among the survivors exposed *in utero*
Parathyroid disease
Mortality from diseases other than malignant tumors, specifically cardiovascular disease and liver cirrhosis, at higher doses
Specific (humoral or cell-mediated) changes in immunologic competence

Source: W.J. Schull, The Somatic Effects of Exposure to Atomic Radiation: The Japanese Experience; 1947-1997; Proc. Natl. Acad. Sci. Vol. 95, May 1998.

APPENDIX D

REVISED RADIATION DOSE STANDARDS FOR MEMBERS OF THE PUBLIC

Since the time of initial Agreement of Section 177, regulatory standards that limit radiation exposure doses to members of the general public have decreased more than thirty-fold.

The purpose of regulatory dose limits for members of the public is to reduce the harmful effects of radiation on human health to acceptable levels. Our understanding of radiation induced health effects over the past two to three decades has led scientists to conclude that the risk per unit dose is nearly ten fold higher than was previously thought. Consistent with the historical increments in the understanding of radiation health risk were concurrent changes that limited radiation exposures to members of the public. Page 29 of *The Meaning of Radiation for those Atolls in the Northern part of the Marshall Islands that Were Surveyed in 1978*, (ERDA 1980) cites the radiation protection standards in effect at that time as follows:

> "The U.S. government has established that an American should not receive more than 500 mrem of radiation exposure in one year, in addition to radiation that doctors use and that which has always been part of the world. They also establish that the amount of radiation that people who live in the Unites States may receive over a 30 year period should not be more than 5000 mrem."

This standard has been reduced dramatically since 1978 in light of new findings regarding the effects of radiation and an interest in reducing health risks to the general public to the potential harmful effects of ionizing radiation. The major revisions in the radiation protection regulations in the U.S. have occurred in a two-step process. The first occurred in 1990 with the promulgation of revisions to the radiation protection standards set forth by the U.S. Nuclear Regulatory Commission in 10 CFR 20. These revisions included a radiation protection standard of 100 mrem/yr from all sources of radiation for members of the general public (not including medical exposures or exposures to background radiation), along with the adoption of the as-low-as-reasonably-achievable (ALARA) philosophy as a regulation. The adoption of ALARA as a regulatory requirement is especially noteworthy since it requires that radiation exposures to the general public be maintained as far below 100 mrem per year as is reasonably achievable.

The next major revision to the radiation protection standards came with the application of EPA cleanup criteria set forth in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also referred to as Superfund, to sites contaminated with radioactive material. The main objectives of Superfund are to assure cleanup of sites contaminated with hazardous material to acceptable levels and the return of the property to a condition suitable for unrestricted use. The statute is also concerned with ensuring that those individuals and organizations responsible for the contamination are held accountable for the costly cleanup of the sites (see SARA[3] ¶101, 107, 122 and CERCLA ¶101(35), 107, 122(e)).

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[3] Superfund Amendments and Reauthorization Act of 1986

Part 300.430 of Title 40 of the Code of Federal Regulations (40 CFR 300.430) provides criteria for the identification and selection of remediation alternatives for the cleanup of sites on the National Priorities List (NPL). Additional guidance is provided in *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, EPA/540/G-89/004, OSWER Directive 9355.3-01, October 1988 (EPA 1988). These criteria are applicable to sites in the U.S. contaminated with radioactive material.

In accordance with these regulations and guidelines, each alternative is evaluated in detail considering nine criteria. The first two criteria are "threshold" criteria that must be met in order for an alternative to be considered for implementation. The two threshold criteria are as follows:

Overall protection of human health and the environment
Compliance with ARARs[4] of federal and state environmental and public health laws

Five "primary balancing" criteria are used to make comparisons and identify the major trade-offs between the remedial alternatives. Alternatives that satisfy the threshold criteria are evaluated further using the following five balancing criteria:

Long-term effectiveness and permanence

Reduction of toxicity, mobility, or volume of contaminated media

Short-term effectiveness

Implementability

Cost

The remaining two criteria, state acceptance and community acceptance, are "modifying" factors. The following presents a more detailed description of the criteria.

<u>Overall Protection of Human Health and the Environment</u>

This criterion relates to whether the alternative provides adequate protection of human health and the environment and describes how risks posed by each potential exposure pathway are eliminated or reduced. This criterion evaluates the long-term benefits to public health and the environment in contrast to any short-term or long-term risks posed by the implementation of the alternative. Part 300.430(e)(2) states:

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[4] ARARs is the acronym for Applicable or Relevant and Appropriate Regulations. Detailed guidance regarding the identification and selection of ARARs is provided in ACERCLA Compliance with Other Laws Manual, EPA/540/G-89/009, OSWER Directive 9234.1-02, August 1989 (EPA 1989a).

"For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response."

EPA 1989[5] and 1992[6] provide additional guidance regarding protection of those individuals that may be expected to receive the reasonable maximum exposure (RME). These guidelines establish that the risk-based cleanup criteria apply to the members of the exposed population that are anticipated to receive high-end exposures, where high-end is defined as above the 90 percentile level.

When establishing requirements for cleanup, EPA places primary reliance on the doses and risks associated with the reasonable maximum exposure of individuals. EPA 1989 states that:

"*... actions at Superfund sites should be based on an estimate of the reasonable maximum exposure (RME) expected to occur under both current and future land use conditions. The reasonable maximum exposure is defined here as the highest exposure that is reasonably expected to occur at a site . . . The intent of the RME is to estimate a conservative exposure case (i.e., well above the average) that is still within the range of possible exposures.*"

Additional guidance provided in EPA 1992 states the following:

"*Information about individual exposure and risk is important to communicating the results of a risk assessment. Individual risk descriptors are intended to address questions dealing with risks borne by individuals within a population. These questions can take the form of:*

1. *Who are the people at the highest risk?*
2. *What risk levels are they subjected to?*
3. *What are they doing, where do they live, etc., that might be putting them at higher risk?*
4. *What is the average risk for individuals in the population?*

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5 EPA 1989, U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A) Interim Final, EPA/540/1-89/002, December 1989, (page 6-4) (EPA 1989b).

6 EPA 1992, U.S. Environmental protection Agency, Guidance on Risk Characterization for Risk Managers and Risk Assessors, Memo from F. Henry Habicht III, Deputy Administrator, to Assistant Administrators and Regional Administrators, February 26, 1992 (EPA 1992).

The high-end of the risk distribution is, conceptually, above the 90th percentile of the actual (either measured or estimated) distribution. The conceptual range is not meant to precisely define the limits of this descriptor, but should be used by the assessor as a target range for characterizing high-end risk."

More recently, the EPA issued two directives that explicitly apply the risk-based criteria to sites contaminated with radioactive material. The directives are:

Establishment of Cleanup levels for CERCLA Sites with Radioactive Contamination, OSWER No. 9200.4-18, August 22, 1997 (EPA 1997).

Radiation Risk Assessment at CERCLA Sites: Q&A, Directive 9200.4-31P, EPA 540/R/99/006, December 1999 (EPA 1999).

These EPA directives establish 15 mrem per year as the dose to the high-end individual that constitutes compliance with the upper end of the risk-based cleanup criteria of 1E-04. On December 21, 1998, following a hearing on the matter of cleanup criteria, the Nuclear Claims Tribunal of the Republic of the Marshall Islands adopted 15 mrem per year EDE above background as the cleanup criterion for the Northern Atolls (Memorandum of Decision and Order, NCT No. 23-0902).

Compliance with Applicable or Relevant and Appropriate Regulations (ARARs)

Remedial alternatives are evaluated to determine whether they attain ARARs and To Be Considered (TBC) material under Federal or State environmental laws. For CERCLA sites with radioactive contamination, EPA 1997 establishes that the radiation dose rate that corresponds to the upper end of the acceptable risk range is 15 mrem/yr effective dose equivalent (EDE), and that this is the dose-based cleanup criterion for sites on the NPL contaminated with radioactive material.[7]

Long-Term Effectiveness and Permanence

This criterion evaluates the long-term effectiveness and permanence each alternative affords, along with the degree of certainty that the alternative will prove effective. The magnitude of residual risk remaining from untreated waste or treatment residuals is considered. The characteristics of the residuals are considered to the degree that they remain hazardous, taking into account their volume, toxicity, mobility, and tendency to bioaccumulate. The adequacy and reliability of controls necessary to manage treatment residuals and untreated waste are also considered. This criterion addresses the uncertainties associated with land disposal for providing long-term protection from residuals, the potential need to replace technical components for the alternative, and potential exposure pathways should the remedial action need replacement.

[7] U.S. Environmental Protection Agency, AEstablishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination,≅ OSWER No. 9200.4-18, August 22, 1997 (EPA 1997).

For atolls of the Marshall Islands this criterion is especially important because of the extreme burden placed on a resettled population if it is later determined that the remedy is not entirely effective. In addition, the costs to revisit these issues in the future would be especially burdensome given the remote location of the atolls.

Reduction in Toxicity, Mobility or Volume

The criterion addresses the degree to which the alternatives employ treatment technologies that reduce toxicity, mobility, or volume. The treatment employed by the alternative is assessed as to the amount of hazardous contaminants removed, destroyed or treated, the degree of expected reduction in toxicity, mobility, or volume of the waste, the degree to which the treatment is irreversible, the type and quantity of residuals that will remain after treatment, and the degree to which the treatment reduces the inherent hazards at the site.

Short-Term Effectiveness

This criterion assesses the short-term effectiveness of the alternative. This criterion analyzes the short-term risks that may be posed to the community during implementation of the alternatives, potential impacts on workers and the environment during remedial action, and the effectiveness and reliability of protective measures. The amount of time until remedial action objectives are achieved is also evaluated.

This criterion is concerned primarily with reducing the potential health risks to the exposed population as quickly as possible. In the case of several atolls of the Marshall Islands, such as Bikini and Rongelap, the people are currently living under stressful conditions on Kili and other locations and need to return to their home atoll as soon as possible. Hence, as applied to Bikini and Rongelap, this criterion is best interpreted as the ability of the remedy to expedite the resettlement of the atoll.

Implementability

This criterion assesses each alternative for ease or difficulty of implementation. This assessment includes: technical feasibility, administrative feasibility, reliability, the ability to monitor the effectiveness of the remedy, the availability of services and materials necessary to implement the alternative, ability to construct and operate, the ease of undertaking additional measures (if necessary), ability to obtain approvals from other agencies, the availability of necessary equipment and specialists, and the timing of new technologies.

In the case of atolls of the Marshall Islands, Implementability is of special concern due to the remote location and the inaccessibility and/or unavailability of materials, equipment, utilities, and trained manpower.

Cost

This criterion includes a calculation of the estimated present worth for each alternative. Costs that are considered in the evaluation include both direct and indirect capital costs and operation and maintenance (O&M) costs.

State Acceptance

This criterion relates to the State perception of the selected remedy and its acceptability as the method of remediation. State acceptance indicates whether the state concurs with, opposes, or has no comment on the selected remedy. As applied to atolls in the Marshall Islands, State Acceptance may be interpreted as acceptance by the central government.

Community Acceptance

This criterion relates to the public perception of the selected remedy and its acceptability as the method of remediation. In the case of atolls of the Marshall Islands, community acceptance may be interpreted as acceptability to the local government council and the people of the atoll.

REFERENCES

EPA 1988, U.S. Environmental Protection Agency, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, EPA/540/G-89/004, OSWER Directive 9355.3-01, October 1988.

EPA 1989a, U.S. Environmental Protection Agency, *CERCLA Compliance with Other Laws Manual*, EPA/540/G-89/009, OSWER Directive 9234.1-02, August 1989.

EPA 1989b, U.S. Environmental Protection Agency, *Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A) Interim Final*, EPA/540/1-89/002, December 1989.

EPA 1992, U.S. Environmental Protection Agency, *Guidance on Risk Characterization for Risk Managers and Risk Assessors*, Memo from F. Henry Habicht III, Deputy Administrator, to Assistant Administrators and Regional Administrators, February 26, 1992.

EPA 1997, U.S. Environmental Protection Agency, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, OSWER No. 9200.4-18, August 22, 1997.

EPA 1999, U.S. Environmental Projection Agency, *Radiation Risk Assessment at CERCLA Sites: Q&A*, Directive 9200.4-31P, EPA 540/R/99/006, December 1999.

ERDA 1980, U.S. Energy Research and Development Administration, *The Meaning of Radiation at Bikini Atoll.*

APPENDIX E

THE HIGH COST OF CLEANUP THAT COULD NOT HAVE REASONABLY BEEN IDENTIFIED AT TIME OF AGREEMENT

At the time of Section 177 agreement, the Northern Marshall Islands Radiological Survey (NMIRS) had provided evidence of radiological contamination that precluded resettlement of contaminated atolls/islands without extensive prior cleanup. The high cost of cleanup could not reasonably have been identified at time of the Agreement for two reasons: (1) the cleanup criterion was reduced more than thirty-fold from 500 mrem per year to 15 mrem per year (see Appendix C), and (2) only limited experience had been gained pertaining to cleanup methods and their limitations. Consequently, very little if any data existed that could have provided a credible basis for estimating cleanup costs. Only with the enactment of Superfund did a comprehensive process develop that would formalize specific protocols and permit the derivation of remediation costs.

CERCLA Overview

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980.

The law authorizes two kinds of response actions:

1. Short-term removals where actions may be taken to address releases or threatened releases requiring prompt response.

2. Long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on EPA's National Priorities List (NPL).

CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the NPL.

CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986.

SARA

The Superfund Amendments and Reauthorization Act (SARA) amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on October 17, 1986.

SARA reflected EPA's experience in administering the complex Superfund program during its first six years and made several important changes and additions to the program. SARA:

1. stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites;

2. required Superfund actions to consider the standards and requirements found in other State and Federal environmental laws and regulations;

3. provided new enforcement authorities and settlement tools;

4. increased the focus on human health problems posed by hazardous waste sites;

5. encouraged greater citizen participation in making decisions on how sites should be cleaned up.

SARA also required EPA to revise the Hazard Ranking System (HRS) to ensure that it accurately assessed the relative degree of risk to human health and the environment posed by uncontrolled hazardous waste sites that may be placed on the National Priorities List (NPL).

In spite of the fact that Superfund was enacted twenty years ago, actual cleanup of contaminated sites has been slow. In part, this has been due to the fact that most cleanup strategies involve new and emerging technologies. As such, they lack maturity and a proven track record.

The need to employ cleanup technologies that will satisfy established safety standards and are cost effective has prompted the EPA to identify new and emerging technologies in recent years under its <u>Superfund Innovative Technology Evaluation Program</u> (SITE). In this program, the Agency has compiled a data base from information supplied by vendors. Summarized in this data base, called "Vendor Information System for Innovative Treatment Technologies" (VISITT) are critical data that for the first time quantify the efficacy of various remediation technologies and provide estimates of costs.

<u>Recent Estimates for Remediation Costs in the Marshall Islands</u>

In 1999, the local governments of Enewetak and Bikini Atolls conducted their own studies. The primary objectives of the studies included (1) an assessment of all currently available remediation technologies, (2) their feasibility to meet the Nuclear Claims Tribunal adopted cleanup standard of 15 mrem, (3) their acceptability to the indigenous population groups, and (4) estimates of cost.

The cost of remediation for each of the two atolls has been formally presented to the Nuclear Claims Tribunal. Cost estimates were principally based on the following:

1. BARC Reports. The Bikini Atoll Rehabilitation Committee (BARC) was established at the request of Congress (House Report 99-450) to report independently on the feasibility and cost of rehabilitating Bikini. The final BARC Report (No. VI) contained the best estimates of cost and was issued in 1988.

2. EPA Data Bases. The aforementioned information pertaining to CERCLA, SARA, SITE, VISITT, Superfund Records of Decisions (RODs), and empirical data in behalf of past cleanup efforts.

Based on the most current data, cost estimates derived in these two studies for Enewetak and bikini are well in excess of the monies that had been appropriated for remediation at the time of the Section 177 Agreement.

The higher estimates of remediation costs should come as no surprise in light of the more stringent dose and cleanup standards that evolved during the intervening years and our improved understanding of the many emerging and complex remediation technologies.

The complexity and rising cost of cleanup has been acknowledged by the DOE in its own effort to cleanup U.S. contaminated sites in order to protect the health of its citizens. The following are excerpts from the 1995 DOE publication, *Closing the Circle on the Splitting of the Atom*, Department of Energy, Office of Environmental Management, 1995:

Page vii (Letter from the Secretary, the Honorable Hazel R. O'Leary):

> "Although the war that gave us the atomic bomb ended half century ago, and the Cold War that followed is now over, the full story of the splitting the atom has yet to be written. *Closing the Circle on the Splitting of the Atom* reveals one of the story's biggest missing pieces. It describes the environmental legacy of nuclear weapons production in the United States and what the Department of Energy is doing about it."
>
> "We are now embarked on another great challenge and a new national priority: refocussing the commitment that built the most powerful weapons on Earth towards the widespread environmental and safety problems at thousands of contaminated sites across the land. We have a moral obligation to do no less, and we are committed to producing meaningful results. This is the honorable and challenging task of the Department's Environmental Management program."

Page xiii: Introduction (by Thomas P. Grumbly, honorable Assistant Secretary for Environmental Management):

> "In the grand scheme of things we are a little more than halfway through the cycle of splitting the atom for weapons purposes. If we visualize this historic cycle as the full sweep of a clockface, at zero hour we would find the first nuclear chain reaction by Enrico

Fermi, followed immediately by the Manhattan Project and the explosion of the first atomic bombs. From two o'clock until five, the United States built and ran a massive industrial complex that produced tens of thousands of nuclear weapons. At half past, the Cold War ended, and the United States shut down most of its nuclear weapons factories.

The second half of this cycle involves dealing with the waste and contamination from nuclear weapons production - a task that had, for the most part, been postponed into the indefinite future. That future is now upon us.

Dealing with the environmental legacy of the Cold War is in many ways as big a challenge for us today as the building of the atomic bomb was for the Manhattan Project pioneers in the 1940s. . . ."

In 1998, the Department of Energy, Office of Environmental Management, submitted revised cleanup costs. Table E-1 summarizes estimated cleanup costs for DOE's five most expensive sites.

Table E-1. Cleanup costs for DOE's Five Most Expensive Contaminated Sites (1998 dollars)

Site	Estimated Cleanup Cost
Hanford Reservation	$50,300,000,000
Savannah River Site	$29,700,000,000
Oak Ridge Reservation	$13,100,000,000
Idaho National Engineering and Environmental Laboratory	$16,300,000,000
Rocky Flats Environmental Technology Site	$6,300,000,000
TOTAL	$115,700,000,000

Source: *Accelerating Cleanup: Paths to Closure*, Department of Energy, Office of Environmental Management, DOE/EM-0362, 1998.

APPENDIX F

UNEXPECTED RADIATION INJURY CLAIMS REQUIRING COMPENSATION

Through March 31, 1999, the Tribunal had awarded in excess of $71 million in compensation for personal injuries. This amount has been awarded to or on behalf of 1,656 individuals and exceeds by nearly $25 million the $45.75 million that had been appropriated for the full 15-year period by the Section 177 Agreement.

Because of this shortfall of available funds, more than 650 (39%) of 1,671 awardees have died prior to receiving full payment of compensation awarded for their personal radiation injury claims.

It must be emphasized that no scientific analysis was undertaken by the U.S. Government to assess and quantify future incidences of radiation health effects that might be expected on the basis of a collective radiation dose. In fact, as RMI officials learned in 1994, there was an active debate among U.S. officials involved in negotiating the Agreement as to whether the nuclear claims issue should have been part of the political status negotiations at all. The reason for this debate was due to the fact that prior attempts to quantify damages and limit liability through earlier settlements had failed due to what one senior official called a "dismal record of miscalculation" by the U.S. with respect to assessments of the level of contamination and health effects (Hills 1994).

In effect, an accurate projection of all future radiation health effects would at a minimum have required a complete and thorough knowledge of the collective time-integrated population dose that resulted from the NTP.

Without reliable information about exposure levels experienced by individual population groups and accurate radiation risk coefficients, there could be no proof or showing of a probability that radiation had caused the myriad of medical conditions suffered by the exposed populations; and without such proof, all personal injury claims brought before the Tribunal would all face the risk of dismissal.

In late 1990, however, the Tribunal became aware of U.S. legislation known as the "Downwinders' Act," which had been passed into law by the Congress earlier that year. In that Act, the Congress found that fallout emitted from the atmospheric nuclear tests conducted at the Nevada Test Site exposed American civilians "to radiation that is presumed to have generated an excess of cancers among those individuals." Based on that finding, the Congress established a program which provides compensation for specified diseases to U.S. civilians who were physically present in any "affected area" during the periods of atmospheric testing in Nevada (between January 1951 and October 1958 or during July 1962).

Such a presumptive approach was precisely what the Tribunal had been authorized to employ by its enabling legislation. And it clearly reflected both the need for an efficient, simple and cost-effective program and the recognition of the difficulties of individual proof of causation associated with injuries due to exposures to ionizing radiation.

The affected area defined in the U.S. Downwinders legislation includes at least 15 counties covering more than 83,000 square miles in the states of Nevada, Utah and Arizona. Places as far as 443 miles away from the Nevada Test Site are included in the affected area. According to a report by the U.S. Defense Nuclear Agency, 87 atmospheric nuclear tests were conducted at the Nevada Test Site during the periods specified under the Downwinders Act. The largest of those tests was 100 kilotons (0.1 megaton) and the total yield of all 87 tests was approximately 1.1 megatons.

Given the fact that the total yield of the 67 tests conducted in the Marshall Islands was approximately 99 times the total of the Nevada atmospheric tests, there was more than adequate justification for the Tribunal to presume that the affected area for its program should encompass all of the nation's atolls and islands.

The Tribunal began to implement its personal injury compensation program in August 1991. Like the U.S. Downwinders' program, the Tribunal's program involved two presumptions. First, residency in the Marshall Islands was used as the basis for assuming exposure to levels of ionizing radiation sufficient to induce one or more of the listed medical conditions. Second, the manifestation of a radiogenic medical condition is presumed to result from (i.e., was caused by) the assumed exposure to radiation due to the testing program.

In adopting this approach, the Tribunal concluded that the failure of the U.S. to maintain contemporaneous exposure data during and after the testing period, the lack of advanced medical diagnostic services, and the absence of baseline non-radiation risk factors for people of the Marshall Islands all combined to make the "presumed list" method of assessing claims both reasonable and fair.

Thus, the Tribunal's personal injury compensation program now encompasses 35 medical conditions, each one of which has been adopted based on accepted scientific and medical research findings about the effects of radiation on humans or on established precedent in a U.S. program entitling American citizens to compensation for conditions presumed to result from radiation exposure.

REFERENCES

Hills, H., February 1994, H.R. Radiation Exposure Oversight Hearing, (written statement of Howard Hills, former counsel and U.S. Department of Defense Adviser to the NSC negotiating team and during Congressional hearings on the Compact).

APPENDIX G

EVIDENCE THAT PREVIOUSLY PUBLISHED RADIATION DOSES BY THE DOE LACKED SCIENTIFIC CONSENSUS AND WERE GROSSLY UNDERESTIMATED

A review of the scientific literature validates the RMI Government's concern that DOE's previous estimates of radiation doses have been questioned by the scientific community at large and appear to have been grossly underestimated.

Between 1946 and 1958, the United States detonated 67 nuclear weapons in the Marshall Islands, which to varying degrees contaminated individual atolls and exposed their inhabitants to radioactive fallout. By far, the nuclear test that resulted in the worst contamination and the largest human radiation doses was BRAVO shot at the Bikini Atoll on March 1, 1954. BRAVO was a 15-megaton thermonuclear (i.e., hydrogen) bomb that was 1,000 times more powerful than the atomic bomb dropped on Hiroshima; even more profound is the fact that this single weapon test was more than ten (10) times as powerful as the combined 107 nuclear weapons tested in the continental United States (Table G-1)!

Table G-1. Atmospheric Nuclear Weapon Tests Conducted by United States (Source: DNA 1986)

Location of Test	Number of Weapons Detonated	Total Yield (Mega-tons TNT)	Percentage Total Yield
Continental United States	107	1.38	1%
Marshall Islands	66	107	77%
- Bikini Atoll	22	78.8	56%
(BRAVO shot)	(1)	(15)	(6.5%)
- Enewetak Atoll	44	30.2	21%
All Other	55	30.6	22%

Bikini Atoll is approximately 95, 100, and 300 miles from Ailinginae, Rongelap, and Utrik/Ailuk, respectively. The residents of these atolls were not evacuated prior to BRAVO and were thus subject to intense radiation fallout that followed. Acute radiation doses to the whole body from external radiation for residents on Rongelap were considered lethal and would have resulted in deaths in the absence of medical intervention that was provided within days of exposure (Cronkite et al. 1955).

Radiation doses to the thyroid and to the whole body of individuals exposed to BRAVO fallout have been described in numerous publications over the years and include BEIR V Report, which states the following:

"... The radiation dose to the thyroid glands of the residents ... was in part from external gamma rays from fallout dust (1.75, 0.69, and 0.14 Gy for those of Rongelap, Alinginae, and Utirik atolls, respectively) and in part from inhaled and ingested radioiodides. Doses of the ingested radioiodides were calculated from the ^{131}I content of pooled urine samples collected 15 days after the first exposure [Conard 1980, Conard 1984]; ... Two-thirds of those on Rongelap atoll and 5% of those on Alinginae atoll suffered nausea within 48 hours. Half of the Rongelap atoll natives developed partial epilation beginning 2 weeks after exposure, indicating significant total-body and body surface doses. By 8 years after exposure, two boys who were 1 year of age when they were irradiated were diagnosed with myxedema [Conard 1980]. Nine years after exposure, the first thyroid nodule was noted in a 12-year-old girl. The seriousness of the situation was apparent by 1965, and prophylactic thyroid hormone treatment was then initiated in residents of Rongelap atoll; prophylaxis was initiated 4 years later in residents of Alinginae atoll."

A most significant observation made by the BEIR V Committee centered around the concern that (1) the nature of thyroid health effects and (2) the incidence rate of thyroid pathologies did not correspond to the low thyroid doses that had been estimated by the DOE. This skepticism is voiced in the following BEIR V statement:

"The thyroid status of the Marshall Islanders 27 years after exposure is summarized in Table [G-2] Although the dose estimation is open to question, the prevalence of hypothyroidism, thyroid nodules and proven thyroid cancer all appears to increase with dose (Co84) [Conard 1984]." [Emphasis added.]

Table G-2. Prevalence of Thyroid Abnormalities Among Marshall Islanders 27 Years (1981) After Exposure to Fallout (Source: NRC 1990, Conard 1984)

Group and Age, 1954	Number of Subjects	Dose (Gy)	Percent with Condition		
			Hypothyroid	Nodules	Cancer*
Rongelap					
1 yr	6	≥15	83.3	66.7	0
2-9	16	8-15	25.0	81.2	6.2
≥10	45	3.4-8	8.9	13.3	6.7
Alinginae					
<10	7	2.8-4.5	0	28.6	0
≥10	12	1.4-1.9	8.3	33.3	0
Utirik					
<10	64	0.6-1.0	0	7.8	1.6
≥10	100	0.3-0.6	1.0	12.0	2.0
Controls					
<10	229	---	0.4	2.6	0.9
≥10	371	---	0.3	7.8	0.8

* Values are conservative estimates; unoperated nodules were considered benign, and occult carcinomas were excluded.

Concern about the accuracy of estimated thyroid doses had been voiced much earlier by others. In a 1973 report issued by the National Academy of Sciences Advisory Committee on Civil Defense (DCPA Research Report No. 20, November 1973), the following statement appears in Chapter 4:

> "The discovery a decade later of severely damaged thyroids in those Marshallese who were exposed as children to the fallout from the March 1, 1954, BRAVO shot, in two instances amounting to complete ablation, and almost surely due to radioiodine, raised the question of the pathway by which that exposure occurred. . . . Direct data on the thyroid exposure were not available, partly because the problem was not appreciated then, . . . and partly because gamma spectral analysis was in its infancy. Direct measurement of thyroid burden was not possible as it is today. On the other hand, it is readily demonstrable that there were massive external and internal exposures to a wide mix of fission products, including the radioiodines.
>
> The severity of the thyroid damage suffered by the Marshallese has raised the specter of a possible neglected but important danger from radioiodine in fallout particles." [Emphasis added.]

Equally, at a 1978 conference sponsored by the International Atomic Energy Agency (IAEA), clinical data were presented pertaining to the observed cases of hypothyroidism (i.e., thyroid ablation) among the Marshallese exposed to BRAVO fallout (Larsen et al. 1978). A panelist at the conference raised the following question regarding the observed clinical data and their assumed thyroid doses (Larsen et al. 1978, page 113):

> "I wonder what reliance can be placed in the doses you report, because I do not believe that 1000 rads, or 1500, would have been enough to suppress the hormonal activity of the thyroid gland of two children contaminated when they were one year old. In fact, to obtain such a result, doctors have to administer a dose of ^{131}I giving at least 100,000 rad. It is true that this applies to adults, but all the same the dose difference appears considerable."

These lingering concerns must be viewed in context of our current understanding of the dose-response relationship pertaining to hypothyroidism. Unlike thyroid nodules, thyroid adenomas, and thyroid carcinomas that were also observed among the exposed Marshall Islanders, hypothyroidism is not a probabilistic (i.e., stochastic) radiation induced health effect. Consistent with other non-stochastic effects, hypothyroidism results from killing of thyroid cells. The above-cited clinical observation of "complete ablation" refers to the total destruction of the thyroid tissue.

An important distinction of non-stochastic effects is that they require a minimum or threshold radiation dose to induce even a mild form of hypothyroidism in an otherwise normal and healthy individual. For a heterogeneous human population, the 50-percentile incidence of hypothyroidism has been estimated at 30,000 rads (300 Gy) under conditions of protracted exposure

(NUREG/CR-4214); for the 83.3-percentile value observed among the Rongelapese (1 year age group) (Table 2), the estimated thyroid dose corresponds to about 60,000 rads (600 Gy) (NUREG/CR-4214, Figure 1.10). Thus, the DOE-assigned value of ≥15 Gy (~1500 rads) is about 40-fold lower than the projected dose of 600 Gy (60,000 rads) identified in NUREG/CR-4214.

An independent scientific investigation of radiation doses to residents of Rongelap/Ailinginae, Utrik, and Ailuk is currently in progress and is expected to be released for public review shortly. Preliminary data suggest that thyroid exposures are likely to have been underestimated 10- to 20-fold; internal exposure of other tissues to more than 100 radioactive fission products, which were never assessed by the DOE, are estimated to have contributed doses between 600 and 1200 rads; and previous external whole-body doses may have been underestimated by a factor of two or more.

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APPENDIX H

RECENT ACKNOWLEDGMENT BY THE DOE OF TOXIC/RADIOACTIVE TRACER CHEMICALS

It was not until 1999 that the DOE informed the RMI Government for the first time that various quantities of "external tracer chemicals" had been used in conjunction with the detonation of nuclear weapons. Table H-1 identifies these "chemical tracers" along with the quantities acknowledged by the DOE. However, no additional data have been provided regarding when or where these tracer chemicals were used.

Table H-1. Trace Chemicals Employed by the NTP in the Marshall Islands

Material	Quantity (gm)
Sulfur	727,000
Arsenic	75.7
Yttrium	236
Rhodium	<200
Indium	2,660
Tantalum	88.3
Tungsten	3,100
Gold	500
Thallium	155,000
Polonium-210	1.09
Thorium-238	0.0023
Thorium-230	1,494
Thorium-232	1,080,000
Uranium-233	1,094
Uranium-238	66,980,000
Americium-241	0.29
Curium-242	1.8

A review of the list of tracer chemicals indicates that several are radioactive and/or chemically toxic and were used in significant quantities. Of concern to the RMI Government is the fact that no attempt has ever been made to include these tracers in past survey measurements or to assess their impacts (past and present) on human health and the environment.

For example, thallium is a known toxin that has been used as a rodenticide and insecticide. Thallium induces degenerative changes in the cells of hair follicle, adrenal cortex, thyroid, and central nervous system. Studies in people who have been acutely exposed to thallium have reported vomiting, diarrhea, and temporary hair loss. For humans, a lethal dose is about 1 gram of absorbed thallium. It should be noted that these effects parallel prodromal effects of the acute radiation syndrome that was experienced by those exposed to BRAVO fallout on Rongelap.

APPENDIX I

THE INCLUSION OF AILUK IN MEDICAL HEALTH CARE PROGRAMS

Section 1 of the Agreement commits the U.S. Government to assist the Government of the Marshall Islands in its health-care system, health-care programs and services related to consequences of the Nuclear Testing Program. The current 177 Health Care Plan includes the people of Rongelap, Utrik, Enewetak and Bikini, and DOE's PHRI medical surveillance and monitoring program provides medical monitoring to the highly exposed individuals present on Rongelap, Ailinginae and Utrik during the Bravo test on March 1, 1954.

While extensive study data exist pertaining to exposures from BRAVO fallout to Marshallese on Ailinginae, Rongelap, and Utrik, exposures to inhabitants of Ailuk have never been formally acknowledged by the U.S. Preliminary data, however, suggest that the radioactive BRAVO cloud that passed over Ailinginae, Rongelap, Rongerik and Utrik also passed over Ailuk and resulted in large individual doses. The likehood of this potentially significant exposure has been openly admitted by the DOE (Cronkite et al. 1997 - page 177):

> "The bulk of the native populations within 500 nautical miles (NM) resided in the southeast quadrant out of fallout area. The clouds with radioactive particles passed over Ailinginae, Rongelap, Utrik, and <u>Ailuk</u> depositing fallout and irradiating the persons below from the radioactive cloud (cloud shine)." [Emphasis added.]

While the Marshallese on Ailinginae, Rongelap, and Utrik were evacuated at H+58 hours, H+51 hours, and H+55 to 78 hours, respectively, from these atolls, the people living on Ailuk were not evacuated. The likely magnitude of radiation exposure and DOE's failure to evacuate have also been admitted, albeit in modest terms (Cronkite et al. 1977, page 178):

> "On nearby Ailuk Atoll, about 400 natives with about the same or lesser dose at Utrik were <u>not</u> evacuated." [Emphasis added.]

The reason(s) for this tragic lapse in exercising the U.S. Government's responsibility to protect the people of the Marshall Islands can be inferred from the following statements (Cronkite, et al. 1997, page 176):

> "During previous atomic tests, natives were protected by temporary relocation [<u>before the test</u>]. Gordon Dunning, AEC Division Biology and Medicine (DBM) stated, "the main objection to evacuation is the <u>high cost</u> and the <u>logistic problems</u> presented in supporting such an operation." CJTF-7 concurred emphasizing the military financial <u>austerity for 1954</u> and the lack of ships and aircraft." [Emphasis added.]

Thus, it can be assumed that the failure to evacuate Marshallese prior to BRAVO from Ailinginae, Rongelap, and Utrik, and the subsequent failure to include the people of Ailuk Atoll during the evacuation that followed BRAVO, was simply a decision based on economics and logistics.

Tentative Dose Estimates for the People of Ailuk

Given the proximity of Ailuk Atoll to Utrik Atoll, it is most reasonable to conclude that the airborne activity levels in the cloud passing over Ailuk were similar if not identical to that of Utrik. Moreover, because the people of Ailuk were not evacuated, the duration of exposure was, therefore, longer (essentially to "infinity") and would have resulted in individual doses well in excess of doses received by individuals on Utrik. By virtue of the difference in the number of persons for each of these atolls (157 person for Utrik versus about 400 persons on Ailuk), the collective dose (person-thyroid-rads and person-rads whole body) may, therefore, be assumed about three-fold higher for Ailuk relative to Utrik.

Previous Estimates of Individual Doses to Utrik Population

In a study published by Brookhaven National Laboratory under contract to DOE, Lessard et al (1985) provided dose estimates in behalf of persons exposed on Utrik. These dose estimates are summarized below.

Individual	Thyroid Dose (rads)	External Whole Body Dose (rads)
Utrik Adult Male	150-600	10
Utrik Adult Female	160-640	10
Utrik Child (9 year)	300-1200	10
Utrik Infant (1 year)	660-2,640	10

In a recently sponsored study by the RMI Central Government (Behling et al. 2000), compelling evidence was presented that suggest serious errors had been introduced by Lessard et al. in estimating these doses. The study concluded that the above-cited thyroid doses are likely to be low by a factor of 10 to 20; and that external whole-body dose estimates were likely to be low by at least a factor of two.

Conclusions. From preliminary data presented here, the following conclusions may be drawn:

(1) Estimates of individual doses for persons on Utrik provide a lower limit of individual doses for persons on Ailuk since they were not evacuated.

(2) Dose estimates for Utrik as defined by Lessard et al. 1985 are likely to be low by a factor of 10-20 for thyroid doses; and low by a factor of 2 for external whole-body doses.

(3) The collective thyroid doses (i.e., person-thyroid rads) and external whole-body doses for the exposed population of Ailuk is likely to be three times higher than that for Utrik.

(4) The failure to include the people of Ailuk in previous dose estimates is not readily explained. The U.S. Government acknowledged radiation doses received by the people of Ailuk as well as the conscious decision not to evacuate the people of Ailuk. Additional assistance is clearly needed to respond to the radiation-related medical needs of the people from Ailuk.

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APPENDIX J

DECLASSIFICATION OF DOE DOCUMENTS AND THEIR IMPACTS

A recent review of declassified data suggests that whole body doses associated with BRAVO are a factor of two higher and thyroid doses may be up to 10- to 20-fold higher than estimates previously published in the scientific literature.

As part of an ongoing review of recently declassified documents and information pertaining to the U.S. nuclear testing program conducted in the Marshall Islands, new data and major discrepancies have been discovered pertaining to radiation dose estimates previously cited with regard to population groups exposed to BRAVO shot, March 1, 1954.

Under contract to the Public Advocate of the Nuclear Claims Tribunal, S. Cohen & Associates, Inc. have identified errors in dose estimates published by Brookhaven National Laboratories regarding external whole body exposures and thyroid doses.

In the early 1990's, as part of its "Openness Initiative," the DOE declassified a significant amount of archived documents pertaining to the nuclear test program in the Marshall Islands.

Thus for the first time, key information that was critical to understanding the bases and methodologies employed for previous dose estimates became available. The impact of this newly available data and its significance to "Changed Circumstances" is apparent from the preliminary results of a recent dose-reconstruction study. Under contract to the Public Advocate of the Nuclear Claims Tribunal, an independent scientific investigation revealed major discrepancies/errors associated with previous estimates for both whole-body and thyroid doses.

A full disclosure of these findings is currently being prepared in a comprehensive report that will be made publicly available within weeks.

ATTACHMENT V: ENEWETAK LAND CLAIM

BEFORE THE NUCLEAR CLAIMS TRIBUNAL

REPUBLIC OF THE MARSHALL ISLANDS

In the Matter of the People of Enewetak, et al., Claimants for Compensation	NCT No. 23-0902

MEMORANDUM OF DECISION AND ORDER

On July 16, 1990, the People of Enewetak filed this class action claim with the Marshall Islands Nuclear Claims Tribunal, for damages to land resulting from or arising out of, the Nuclear Testing Program conducted by the United States between 1946 and 1958. The Tribunal has jurisdiction to hear this claim under Section 5(a) of the Marshall Islands Nuclear Claims Tribunal Act 1987, as amended ("NCTA")[1] which gives the Tribunal the duty and responsibility to "decide claims by and disburse compensation to the Government and citizens and nationals of the Marshall Islands under Section 123 for existing and prospective loss of damage to person or property which are based on, arise out of or are in any way related to the Nuclear Testing Program. . ." The question of damages was heard in stages, with the loss of use portion of the claim being heard on January 24 and 27, 1997, and the rehabilitation and other consequential damages portion being heard on April 14 through April 22, 1999.

The issues of fact and law were narrowed in this case through an extended process of filings of prehearing statements which formed the basis for establishing contested and uncontested issues. Based upon that process, the following uncontested factual background has been established.

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[1]42 MIRC 105(a).

I. Factual Background

Enewetak atoll is a low-lying coral atoll located in the northwestern corner of the Marshall Islands, approximately 600 miles from the capital, Majuro. The atoll consists of about 40 islands surrounding a lagoon of about 388 square miles. In February, 1944, U.S troops captured Enewetak from the Japanese. In July, 1947, Micronesia became a United Nations strategic trust territory administered by the United States. In June of 1946, the U.S. began the conduct of the United States Nuclear Testing Program in the northern Marshall Islands. In December, 1947, the people of Enewetak were removed from Enewetak Atoll and transported to Ujelang Atoll. Representatives of the U.S. government represented to the people that the relocation would be temporary, in the likely time frame of three to five years, at which time they could return to Enewetak. At the time of removal, the acreage of the atoll was 1,919.49 acres. During the people's absence, forty-three atomic devices were tested at Enewetak. On October 1, 1980, the claimants returned to Enewetak. At that time, 815.33 acres were returned to their use. Another 949.8 acres were not available for use, and an additional 154.36 acres had been vaporized.

II. Framework of compensation analysis

In the Compact of Free Association, the Government of the United States and the Government of the Marshall Islands made provision for the "just and adequate settlement" of claims of Marshallese citizens resulting from the U.S. nuclear testing program in the northern Marshall Islands between June 30, 1946 and August 18, 1958.[2] The framework for this settlement was more fully set out in the related agreement ("Section 177 Agreement") to implement this section of the Compact.[3] The Section 177 Agreement required the establishment of a Claims Tribunal to "render final determination upon all claims past, present and future, of the Government, citizens and nationals of the Marshall Islands which are based on, arise out of, or are in any way related to the Nuclear Testing Program" and to make awards taking into account "the validity of the claim, any prior compensation made as a result of such claim, and

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[2]Compact of Free Association, Section 177.

[3]Agreement between the Government of the United States and the Government of the Marshall Islands for the Implementation of Section 177 of the Compact of Free Association.

such other factors as it may deem appropriate."[4] This language is echoed at Section 123(12) of the NCTA.[5] The Section 177 Agreement further provides: "In determining any legal issue, the Claims Tribunal may have reference to the laws of the Marshall Islands, including traditional law, to international law and, in the absence of domestic or international law, to the laws of the United States."[6] The NCTA directs that in claims for property loss or damage: "The amount of compensation shall be determined on a case by case basis, taking into consideration, among other things, the amount of property owned, the nature of the ownership interest, and the extent of the loss or damage."[7] In the event the Tribunal determines the claimants suffered loss or damage to person or property, the award order shall "*fully compensate* the people for loss or damage to person or property"[8] (emphasis added.)

The goal of compensation, where there has been harm to property, should be to make the owner whole through the award of proper damages. A general statement for determination of damages to land may be found at the Restatement (Second) Torts §929, Harm to Land from Past Invasions:

> (1) If one is entitled to a judgment for harm to land resulting from a past invasion and not amounting to a total destruction of value, the damages include compensation for
>
> (a) the difference between the value of the land before the harm and after the harm, or at his election in an appropriate case, the cost of restoration that has been or may be reasonably incurred,
>
> (b) the loss of use of the land, and
>
> (c) the discomfort and annoyance to him as an occupant.

This is not an eminent domain proceeding nor a claim under constitutional provisions for just compensation for a taking of property for a public use. Neither the U.S. nor R.M.I. government is a party to this action, and consequently certain elements in a determination of just compensation are not present.

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[4]Section 177 Agreement, Article IV, Section 2.

[5]42 MIRC 123(12).

[6]Section 177 Agreement, Article IV, Section 3.

[7]42 MIRC 123(15).

[8]42 MIRC 123(17)(b)(iii).

Nonetheless, principles of just compensation, to the extent that they aid in a determination of what is necessary to make claimants whole, may be referenced by this Tribunal where appropriate.

Both the United States and Marshall Islands Constitutions prohibit the taking of private property for public use without just compensation.[9] In the U.S. Constitution, this prohibition is found in the Fifth Amendment, where it states in relevant part: ". . . nor shall private property be taken for public use, without just compensation."[10] In the Marshall Islands Constitution, this prohibition is found in the fifth section of Article II, where it states in part: "Before any land right or other form of private property is taken, there must be a determination by the High Court that such taking is lawful and an order by the High Court providing for prompt and just compensation." That Section of the Marshallese Constitution[11]

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[9]Representatives of the U.S. government committed that the relocated inhabitants of Enewetak would "be accorded all rights which are the normal constitutional rights of citizens under the Constitution . . ." (See Claimants's Exhibits 24, 25, 26 and 27.)

[10]The Fifth Amendment in its entirety reads:

> No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, ir in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; *nor shall private property be taken for public use, without just compensation.* (Emphasis added)

Fifth Amendment, Constitution of the United States.

[11]Article II, Section 5 of the Marshallese Constitution reads in its entirety:

> (1) No land right or other private property may be taken unless a law authorizes such taking; and any such taking must be by the Government of the Republic of the Marshall Islands, for public use, and in accord with all safeguards provided by law.
> (2) A use primarily to generate profits or revenues and not primarily to provide a public service shall not be deemed a "public use."
> (3) Land rights shall not be taken if there exist alternative means, by landfill or otherwise, of achieving at non-prohibitive expense the purpose to be served by such taking.
> (4) Before any land rights or other form of private property is taken, there must be a determination by the High Court that such taking is lawful and an order by the High Court providing for prompt and just compensation.
> (5) Where any land rights are taken, just compensation shall include reasonably equivalent land rights for all interest holders or the means to obtain the subsistence and

provides additional protection for land rights and provides how a determination of just compensation is to be made, based in part on the "unique place of land rights in the life and law of the Republic."

III. Loss of Use

The people of Enewetak were denied the use of their land for a period of years. They are entitled to compensation for this loss. No claim is made that there was a permanent taking or that the United States took ownership of the property in question.[12] Consequently it is appropriate to analyze the damage in terms of the lost use to claimants. The U.S. Supreme Court examined the question of the appropriate measure of damages for such lost use in Kimball Laundry Co. v United States (1949) 338 US 1. That case involved the damages suffered by the owners of a laundry taken on a temporary basis by the government during World War II. The Court determined:

> But it was known from the outset that this taking was to be temporary, and determination of the value of temporary occupancy can be approached only on the supposition that free bargaining between petitioner and a hypothetical lessee of that temporary interest would

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> benefits that such land rights provide.
> (6) Whenever the taking of land rights forces those who are dispossessed to live in circumstances reasonably requiring a higher level of support, that fact shall be considered in assessing whether the compensation provided is just.
> (7) In determining whether compensation for land rights is just, the High Court shall refer the matter to the Traditional Rights Court and shall give substantial weight to the opinion of the latter.
> (8) An interest in land or other property shall not be deemed "taken" if it is forfeited pursuant to law for nonpayment of taxes or debt or for commission of crime, or if it is subjected only to reasonable regulation to protect the public welfare.
> (9) In construing this Section, a court shall have due regard for the unique place of land rights in the life and law of the Republic.

[12]The most straight forward statement of this is that of the Captain John P.W. Vest, who had been appointed Governor of the Marshall Islands, in describing his meeting with the people of Enewetak prior to their relocation:

> I told them they would be able to return to Enewetak fairly soon after the tests were completed; perhaps in three to five years. It certainly was not in my mind that it would be longer than that, or that the taking of Enewetak for the testing program was permanent. At the time it was my understanding, and I believe their understanding as well as a result of our discussions, that the people of Enewetak would be able to return to Enewetak Atoll after the testing was concluded, and that the likely time frame for this return was three to five years.

(Affidavit of John P.W. Vest, Claimants' Exhibit 9.)

> have taken place in the usual framework of such negotiations. We agree with both lower courts, therefore, that *the proper measure of compensation is the rental that probably could have been obtained*, and so this Court has held in the two recent cases dealing with temporary takings. United States v. General Motors Corp. 323 US 373, 89 L ed 311, 65 S Ct 357, 156 ALR 390; United States v. Petty Motor Co. 327 US 372, 90 L ed 729, 66 S Ct 596.[13] (Emphasis added.)

To address the value of this lost use, Claimants and the Defender of the Fund offered a joint appraisal[14] report conducted by a team of appraisers consisting of two appraisal firms, one selected by Claimants and one selected by the Defender of the Fund. No objection was raised to the qualifications of the firms and the Tribunal found them to be qualified as experts on the matter of valuation of the property in question.

A. Methodology.

The value of the loss of use may be calculated by multiplying the relevant annual rental value times the affected acreage times the period of years use of the land was lost to the owners. The period of loss has two elements: 1) past loss, which began on December 12, 1947 and ran until the date of the valuation, and 2) future loss, which began on the date of valuation and continues until such time in the future as the affected property is returned to the people of Enewetak in usable condition, determined by the parties to be 30 years from the effective date of the valuation or May 17, 2026. Additionally, adjustment must be made for the deferred nature of the compensation for past loss and a discount for future loss.

B. Annual Rental Value.

The appraisers acknowledged that there are circumstances in the Marshall Islands property ownership situation that create challenges to traditional appraisal methods. These include a customary system of land tenure that is collective in nature and does not include the concept of market value. Ownership of land by foreigners is forbidden by law. As declared by claimants:

The people of Enewetak have always maintained a deep emotional attachment to their

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[13]Kimball Laundry Co. v United States (1949) 338 US 1, 93 L Ed 1765, 69 S Ct 1434 (7 ALR2d 1280, 1287-8).

[14]This joint approach was authorized by the Tribunal in the interest of efficiency and economy in the determination of claims.

> home islands and ancestral land. Under traditional Enewetak land tenure law and custom, every individual was – and still is – born with land rights in the islands of Enewetak Atoll and, collectively with other members of the community, rights to the atoll's lagoon and its resources. These rights provide security to the members of the community. Land is traditionally regarded as a commodity that is not to be sold, even to other members of the Enewetak community, but may only be passed from generation to generation. Each individual is identified with the land that is his birthright, and ties to the land are unusually strong. Throughout Enewetak history land has been regarded as sacred. It has never been sold to outsiders except through fear of physical force or other sanction.[15]

Nonetheless, as time has gone by, the transfer of use rights or possessory interests in land for money has gained a measure of social acceptance and from these transfers the appraisers developed a data base of comparable transactions.

The appraisers determined the islands should be categorized as rural, with a highest and best use of agricultural and residential uses. Two elements of their analysis of comparables bear notice. First is that for the category of rural lands which were deemed to be comparable for the purposes of their market analysis, there was no significant difference in pricing on the basis of the size of the parcel. As noted in their report: "An island or large weto rented for about the same price per acre as a small parcel."[16] Indeed, the appraisers reiterated their point in a post-hearing submission to the Tribunal. "We confirm that is was and remains our conclusion that the historic per acre rental rates (including the 'National Rate') in the Marshall Islands do not vary by size or location."[17] Second is that for rural lands (which all of Enewetak was determined to be) the rental rate was similar regardless of the rural use, e.g.,

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[15]Paragraph 20, CLAIM, In the Matter of the People of Enewetak, NCT No. 23-0902, filed July 16, 1990.

[16]*Appraisal Report of the Loss in Value in Enewetak Atoll, Republic of the Marshall Islands,* jointly prepared by The Hallstrom Group, Inc. and Raymond A. Lesher & Co, Ltd. Claimants' Exhibit 1, Defender of the Fund's Exhibit A (hereafter "Joint Appraisal,") p. 22

[17]"Response to Questions Regarding the Joint Appraisal of Enewetak Atoll," from Raymond Lesher and James Hallstrom to Tribunal Members, dated January 31, 1997, filed March 12, 1997 (hereafter "Response Letter.")

residential or agricultural.[18] James Hallstrom, one of the appraisers who authored the joint report, testified at the loss of use hearing that while consideration was given to including values from outside the Marshall Islands, this approach was rejected because it would have required a considerable degree of subjective adjustments for location. Only Marshall Island transactions were considered as they were more directly germane.

Over 470 transactions were collected to be reviewed for comparability with the property at issue. Of these, some 174 of the properties were determined to be comparable to the subject. Despite this extensive database, there was a relative scarcity of transactions in the early years of the lost use. This problem was addressed through trending analysis from which the annual rates could be derived. This analysis combined two different approaches. One approach utilized a pure exponential trend fit to the database. The other approach utilized an exponential fit for the first twenty years of the period of lost use and subsequently incorporated the government rental rate because of its acceptance as a fairly determined rate of rent and its widespread use as a benchmark for private lease agreements. In both cases, the use of an exponential curve was justified on the basis that "its relatively low statistical deviation from the data [compared to other different curves tested] . . . more accurately simulat[ed] market activity over time."[19] This correlated approach resulted in annual rental values ranging from $41 per acre in 1947 to $4,105 per acre in 1996.

The valuation must additionally recognize the effect of the lost use of the proceeds from the annual rentals. Adjustment for past loss is made by adding an interest component to the annual proceeds, which was compounded using the average annual U.S. Treasury 30-year bond rate as the benchmark rate of investment.[20]

C. Acreage and period of lost use.

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[18]Joint Appraisal, p. 22.

[19]Response Letter (f.n. 15.)

[20]Joint Appraisal, p. 27.

In this case, the parties have agreed on the relevant land areas and period of lost use.[21] They are as follows:

12/21/1947 to 09/30/1980	1,919.49 acres
10/01/1980 to 01/24/1997[22]	1,104.16 acres
01/24/1997 to 5/16/2026[23]	1,104.16 acres.

Included in the loss of use calculations is the acreage of the vaporized islands. Although arguably these islands were permanently lost upon their vaporization, the Tribunal is persuaded to treat them as temporarily lost for the following reasons. First, in the context of this class action, the vaporized islands must be regarded as a part of an environmental whole which consists of the entire atoll ecosystem. Thus, although a portion of the atoll was damaged through the destruction of the vaporized islands, the atoll as a whole is the relevant unit for characterization of the loss. Secondly, the problems with determining a fee simple value in the Marshall Islands where such transactions are virtually unknown and not subject to market analysis preclude the evaluation of such a loss.

Based upon the annual rental rates, the affected acreage and number of years to the date of the hearing, the rental values for past lost use (including interest) amount to $304,000,000.[24]

These values must be further adjusted for compensation already received by the People of Enewetak. The Defender of the Fund initially put forth nineteen items of prior compensation to be considered by the Tribunal.[25] In its ORDER,[26] the Tribunal recognized eleven of these items as

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[21]Claimants' Exhibit 3, Defender's Exhibit C.

[22]Date of the hearing on loss of use.

[23]Although Claimants' Exhibit 3, Defender's Exhibit C adjusted past loss to the date of the hearing on loss of use, no adjustment was made to the period of future lost use.

[24]The calculation of this number is found in Claimants' Exhibit 5 and Defender's Exhibit E. The exact calculation was $304,257,512, which the appraisers rounded to the nearest million dollars.

[25]MOTION TO CONSIDER THE PRIOR COMPENSATION TO CLAIMANTS STATED IN EXHIBIT "A" AS A SETOFF AGAINST ANY AWARD OF DAMAGES, filed by the Defender of the

potentially appropriate for consideration and granted the Defender the opportunity to present evidence on those items. Two additional items were denied with the provision that the Defender could bring them forward for reconsideration if additional information relating to them became available. The parties resolved their differences on these issues via stipulation which provided for valuation of six of the items.[27] The items of prior compensation are as follows: payment made to the people of Enewetak on or about November 19, 1956 in the amount of $175,000; payment made to the people of Enewetak on or about August 19, 1969 in the amount of $1,020,000; payment made to the people of Enewetak on or about September 30, 1976 in the amount of $750,000; payment made to the people of Enewetak on or about December 18, 1978 in the amount of $750,000; annual payments of $3,250,000 from 1987 through 1999 pursuant to the Section 177 Agreement;[28] and the amount of $10 million for resettlement of Enjebi Island.

The stipulation also provided for valuation of the use of Ujelang by the people of Enewetak from December 21, 1947 to September 30, 1980.[29] The annual per acre value for the use of Ujelang was determined to be fifty-eight percent of the annual per acre value of Enewetak. This reduction was based upon the relative scarcity of resources in Ujelang and the relative lack of access to off-island resources because of poor transportation to the atoll. These factors affect the highest and best use of the atoll. While Enewetak was determined to have the highest and best use of agricultural/residential uses, the lack

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Fund on June 16, 1997.

[26]ORDER AND MEMORANDUM OF DECISION, filed November 28, 1997.

[27]Items 1, 3, 5, 6, 7, and 19 from Exhibit "A" of Defender's June 16, 1997 MOTION.

[28]Article II, Section 3.

[29]In entering the stipulation, the claimants maintain their position that the use value of Ujelang should not be considered as prior compensation or an offset by the Tribunal (STIPULATION, filed March 17, 2000.) The Tribunal ruled in its DECISION AND ORDER of December 6, 1999 that the use of "Ujelang will be taken into consideration by the Tribunal as an item of prior compensation."

of resources and transportation preclude such use in Ujelang.[30] This conclusion is reinforced by the absence of activity on Ujelang at the present time, even in light of the scarcity of land in the Marshall Islands.

Except for the Enjebi Trust Fund,[31] these items of prior compensation are set off against the annual past loss of use values in the year received by the Enewetak people. This has the effect of reducing the overall value of past lost use not only by the actual amount of the past payments, but also by reducing the interest on the net annual lost use value. In the case of Ujelang, the annualized use value for each year between 1947 and 1980 (when the people returned to Enewetak) is set off against the respective annual loss of use values for Enewetak.[32]

The value of past lost use, adjusted for prior compensation, is $149,000,000.[33]

D. Compensation for Future Denied Use.

To determine the compensation for future loss of use, the appraisers utilized an income capitalization approach. As described in the Report: "This method is used to convert a single year's income into an indication of present value by dividing the most current stabilized income by an appropriate rate of return." This rate of return was determined to be eight per cent, based upon data from Marshall Islands transactions, as well as making reference the rate used in other Pacific islands.[34]

Claimants suggested alternatively that the value of future lost use be calculated as the "annual

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[30]See *Ujelang Atoll Consultation, Republic of the Marshall Islands*, prepared by the Hallstrom Appraisal Group January 11, 200, and filed with the Tribunal by Claimants in response to Tribunal order of December 6, 1999.

[31]The parties stipulated that the $10 million Enjebi Trust Fund would be set off against the restoration award.

[32]The calculations are contained in Table 7A-1, part of the STIPULATION filed with the Tribunal on March 17, 2000.

[33]*Ibid.*

[34]Joint Appraisal, p. 28.

rental for land not available (presently 949.8 acres) at the minimum rate of $3,000 per acre per year until the lands become fully usable by the people of Enewetak, plus interest of at least 6.86% on such annual rental until paid."[35] Although the Tribunal perceives the rationale behind the reasoning for this calculation, such an approach would result in an open ended decision. The Tribunal is charged with the final determination of all claims past, present and future arising out of the nuclear testing program. Leaving undecided the question of how long the future lost use would last, is not consistent with the Tribunal's responsibility to make a final determination in this claim.

In the joint appraisal report the present value of the future rents for 1305.78 acres was (as of May 17, 1996) $67,000,000. This acreage was subsequently adjusted downward by stipulation of the parties to 1104.16 acres and the effective date of the appraisal was adjusted to the date of the hearing, January 24, 1997. However, the calculations for the loss of future use were not adjusted to reflect these changes. Because those calculations were based on a time period of thirty years, with a constant annual rental value, adjusted to present value, the $67,000,000 may be adjusted by the ratio of the actual acreage (1104.16) to the initial joint appraisal acreage (1305.78). That calculation gives a value for loss of future use of 1104.16 acres for thirty years of $56,654,811. Additionally, Claimants are additionally due $3,250,000 annually in 2000 and 2001 under Section 177 Agreement. This is compensation not yet paid and must be set off against the future loss of use portion of the award.

The value for lost future use, adjusted for anticipated Section 177 payments, is $50,154,811.

IV. Restoration

A. Restoration as appropriate remedy.

Under the Restatement (Second) Torts analysis at §929(1)(a), the injured party who suffered damage to land is entitled to compensation for "the difference between the value of the land before the harm and after the harm, or at his election in an appropriate case, the cost of restoration that has been or may be reasonably incurred." An initial issue is whether the appropriate measure under this subsection is the cost of restoration or the difference in value of the land before and after the harm. The Defender

[35] Claimants' Exhibit 15.

of the Fund raised this issue in the MOTION TO LIMIT CATEGORIES OF DAMAGES CLAIMANTS MAY BE AWARDED AND METHODS OF VALUING DAMAGES FOR CERTAIN CATEGORIES OF DAMAGES.[36] In Paragraph 7 of that MOTION, the Defender asks that the Tribunal "limit the valuation of damages pertaining to all permanent and proven damage and injury such as described in Paragraph 1, as claimant may properly plead and prove, to the value fixed as the difference between the fair market value immediately before the injury to the real property and the value immediately after the injury and interest thereon from the date of the injury." Although both parties submitted legal argument on the issue, the Tribunal found that the record was too undeveloped as to the underlying factual issues to allow a meaningful ruling on the legal issue and that aspect of the MOTION was denied without prejudice.[37] Although Defender has not renewed this aspect of the MOTION, the Tribunal will set out its reasoning for determining that the cost of restoration, rather than the difference in value before and after the injury, is the appropriate measure of damage in this instance.

In the commentary to the cited Restatement provision, it is noted:

> Even in the absence of value arising from personal use, the reasonable cost of replacing the land in its original position is ordinarily allowable as the measure of recovery. . . . If, however, the cost of replacing the land in its original condition is disproportionate to the diminution in the value of the land caused by the trespass, unless there is a reason personal to the owner for restoring the original condition, damages are measured only by the difference between the value of the land before and after the harm. . . . [I]f a building such as a homestead is used for a purpose personal to the owner, the damages ordinarily include an amount for repairs, even though this might be greater than the entire value of the building. So, when a garden has been maintained in a city in connection with a dwelling house, the owner is entitled to recover the expense of putting the garden in its original condition, even though the market value of the premises has not been decreased by the defendant's invasion.[38]

This suggests that unless the cost of restoration is disproportionate to the difference in value before and after the injury to the land, such cost is an allowable measure of damage. Even when such disproportionality exists, if there is a personal reason for the cost of repair, these costs may be allowed. Case law supports this approach. See Heninger v. Dunn (Cal. App. 1980) 162 Cal. Rptr. 104, Orndorff

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[36]Filed June 2, 1995.

[37]DECISION AND ORDER, filed August 11, 1995.

[38]*Restatement (Second) Torts*, Comment on Subsection (1), Clause (a), *b. Restoration*.

v. Christiana Community Builders (Cal. App. 1980) 217 Cal. App. 3d 683. Further, if market value does not adequately capture the value or if is not possible to ascertain the market value of the land, the diminution in market value is not an appropriate measure of damage. See Trinity Church v. John Hancock Mutual Life Insurance Co. (Mass. 1987) 502 N.E. 2d 532, Denoyer v. Lamb (Ohio App. 1984) 490 N.E. 2d 615, Feather River Lumber Co. v. United States (9th Cir. 1929) 30 F.2d 642, 644.

In the present case, both of these conditions are met. There are personal reasons for restoration of the damaged land. These reasons are persuasively set forth by Claimants' expert, Dr. Lawrence Carrucci in his report to the Tribunal:

> For Marshall Islanders in general, and Enewetak people in particular, land is a part of one's person and one's entire identity. It is an integral part of a person's sense of who they are in the world and how their life makes sense as part of a certain culture. One's sense of self, both personal and cultural, is deeply embedded in a particular parcel of land on a particular atoll. . . . Not only is land hyper-valued because it is scarce, land is extremely highly valued because it represents the collective labor of generations of people who have worked the land, transforming it from bush into habitable space [footnote omitted.] Both one's labor and one's physical person, at death, are embedded in land in a manner that irrevocably erases any distinction European's [sic] or Americans might make that would separate one's person and the clan or family land that one inhabits. While Europeans live and die, Enewetak people are but the most visible snippet of a very active group, a clan of relatives who share a totem-like identity, a clan or jowi. Not only does that group represent the continuity of life from ancient times until the current day (jowi), it is manifest in a second visible form, the family land that is the realization of generation upon generation of continuous human occupation that has made untended earth into soil through toil and the physical substance of persons embedded in the molecular structure of that soil.[39]

The shortcomings of a market approach to value, particularly with reference to fee simple rights, are set out in the appraisal report filed jointly by Claimants and the Defender of the Fund:

> Traditionally, Marshallese do not sell land rights which are acquired by birthright. Hence, there is an absence of a real estate market, and while the Marshallese customary system of land tenure has not only precluded the development of a normal market, it fosters an

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[39] Ien Entaan im Jerata: Times of Suffering and Ill Fortune: An Overview of Daily Life on Ujelang and Enewetak since 1946, Laurence M. Carucci, Ph. D. and Mary H. Maifeld, M.A., R.D., A Report Submitted to the Marshall Islands Nuclear Claims Tribunal in behalf of the People of Enewetak, March, 1999, Claimants' Exhibit 147.

attitude about land which does not include the concept of market value.[40]

This point was reinforced in a post hearing submission by the joint appraisal team, where it was stated: "In the history of the Marshall Islands, there has never been any kind of established real estate market to justify such an approach. 'Fee simple' value cannot be derived, nor could anyone sell their birthright ownership."[41] Thus, the diminution in value approach to damages cannot be applied because there is no market in fee simple property to provide comparable values to assess the loss. Further, such a market approach would not provide a true measure of loss because it would not account for the deeply personal reasons of the Enewetak people for restoring their land.

Further support for the cost of restoration approach is found in U.S. environmental statutes. Although these laws may not be applicable by their terms to the Marshall Islands, the Section 177 Agreement provides "In determining any legal issue, the Claims Tribunal may have reference to the laws of the Marshall Islands, including traditional law, to international law and, in the absence of domestic or international law, to the laws of the United States."[42] The Tribunal has referenced U.S. law in a variety of contexts in the past. It has modeled its personal injury compensation program on the "Downwinders Program," devised to compensate civilians affected by the nuclear testing in Nevada and references the U.S. directly in its regulations for the purposes of determining conditions deemed caused by the Nuclear Testing Program.[43] It has adopted certain policies and criteria of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in setting a radiation clean-up standard in the land

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[40]Joint Appraisal, p. 15.

[41]Response Letter, p. 3.

[42]Section 177 Agreement, Article IV, Section 3.

[43]NCT Regulation, Section 224(a), *Comparability with United States Compensation Schemes:*

> Section 220 shall be deemed to include any medical condition(s) not otherwise specifically listed or described for which a claimants would be entitled to compensation in the United States under either the Radiation-Exposed Veterans Compensation Act of 1988, as amended 38 U.S.C. 101 et seq. Note and/or the Radiation Exposure Compensation Act of 1990, as amended.

claims consolidated for that purpose.[44] The Tribunal notes this for the purpose of observing the predisposition toward clean up as a remedy in dealing with hazardous waste in the U.S.[45] The preference for restoration by the U.S. is evidenced in the past U.S. attempts to restore the atoll for the claimants' use.

B. Establishment of Radiation Standard for Restoration.

The Tribunal considered the issue of radiation protection standards for application in clean up and restoration of lands contaminated by the Nuclear Testing Program in a special proceeding which consolidated the various class action claims for damage to property. The Tribunal accepted the position of the IAEA[46] that

> As a basic principle, policies and criteria for radiation protection of populations outside national borders from releases of radioactive substances should be at least as stringent as those for the population within the country of release.[47]

Under this reasoning, the Tribunal adopted the current standards[48] of the U.S. that would apply to

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[44] MEMORANDUM OF DECISION AND ORDER, filed December 21, 1998.

[45] For a discussion of this legislative concern for restoration as a remedy in U.S. environmental statutes, see Cross, Natural Resource Damage Valuation, 42 Vanderbilt Law Review 269, 327-334.

[46] The International Atomic Energy Agency (IAEA) operates under the auspices of the United Nations. It serves as an international forum for scientific and technical cooperation for the peaceful development and safety of nuclear power. While one of its most important responsibilities is to monitor nuclear materials that pass internationally, it is also charged with establishing safety standards for health and property.

[47] Claimants' Exhibit 1 (filed for the consolidated hearing on radiation protection standards on November 18, 1998).

[48] These standards have undergone significant development over time, based in part upon a greater understanding of the health effects of radiation. This enhancement in scientific knowledge is a circumstance which has changed, particularly since the time the Compact of Free Association was negotiated.

Enewetak, were it within the United States. Those standards, established by the U.S. Environmental Protection Agency, are described in an EPA document entitled "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," wherein it is stated:

> Cleanup should generally achieve a level of risk with the 10^{-4} to 10^{-6} carcinogenic risk range based on the reasonable maximum exposure for an individual. . . .
>
> If a dose assessment is conducted at the site (footnote omitted) then 15 millirem per year (mrem/yr) effective dose equivalent (EDE) should generally be the maximum dose limit for humans.[49]

This standard addresses the additional risk created by the contamination, so the 15 millirem level is over and above existing background levels of radiation.

C. Application of Standard.

The parties introduced evidence relating to whether this 15 mrem standard is currently exceeded in Enewetak. The expert testimony[50] of both sides was in agreement that the major pathway or source of radiation exposure to residents of Enewetak would be ingestion of locally grown foods. This pathway is of particular significance in Enewetak because the soil of the atoll allows a relatively high uptake of

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[49]Claimants' Exhibit 11 (filed for the consolidated hearing on radiation protection standards on November 18, 1998), p. 5.

[50]The expert witnesses for claimants were Dr. John Mauro and Dr. Hans Behling, from Sanford Cohen and Associates (hereafter "SCA".) In addition to their testimony, claimants filed a two volume report, *Regarding The Potential Radiation Doses and Health Risks to a Resettled Population of Enewetak Atoll and An Evaluation of the Costs and Effectiveness of Alternative Strategies for Reducing the Doses and Risks* by Drs. Mauro, Behling and Anigstein. *Part 1: Statement Before the Nuclear Claims Tribunal* was admitted as Claimants' Exhibit 45, while *Part 2: Technical Background Document* was admitted as Claimants's Exhibit 46. The expert witnesses for the Defender of the Fund were Dr. George Levin and Dr. Michael Uziel (hereafter "Enviropro.) In addition to their testimony, the Defender filed *Cleanup Standards & Conceptual Remediation Alternatives of Nuclear Waste at Enewetak Atoll, the Republic of the Marshall Islands,* authored by Dr. Uziel of Enviropro, Inc., which was admitted as Defender of the Fund's Exhibit SS.

certain radionuclides by local plants. Both sides agreed that the primary radionuclide of concern was Cesium 137. Application of U.S. standard computer analysis provided that a concentration of cesium in the soil between .32 and .35 picocuries/cubic gram (including background) would result in an annual effective dose equivalent of 15 millirem assuming a local only diet.. The Tribunal believes a local diet is an appropriate assumption for this determination. While the Tribunal recognizes that it may not be likely that the entire population will adhere to a local food only diet, even if available, the Tribunal accepts the EPA reasoning that protection should be extended not just to the average member of the community, but to those who could be characterized as having "high end risk." This concept is captured by the "reasonably maximally exposed individual."[51]

This concentration is the target for any clean-up effort. The parties are in relatively close agreement on this issue. Assuming a local diet, SCA found a cesium concentration of .247 to .274 pCi/g (depending on the methodology utilized for determination of exposure) above background[52] would result in an exposure of 15 mrem/year to the reasonably maximally exposed individual. With background added in, that would amount to a range between .327 and .354 pCi/g. Envirpro determined a concentration of .35 pCi/g would lead to an exposure of 15 mrem/yr based upon a local food only diet. The parties developed their remediation scenarios utilizing this concentration target.

D. Radiological Cleanup Costs.

The parties presented a number of alternative approaches to how the standard could be met. The basic techniques considered were removal of contaminated soil, application of potassium to the soil to reduce the plant uptake of cesium, and phytoremediation (the use of plants to strip the radioactive contaminants from the soil.) While phytoremediation is a promising, developing technology, its effectiveness in Enewetak cannot be evaluated. It is clear that the concept is valid, because the uptake of Cs-137 from the soil by food plants is the major pathway for exposure to residents. However, the application of the technique for cleanup of radioactive contaminants has not been demonstrated in the

[51]Claimants' Exhibit 83.

[52].08 pCi/g.

coral atoll environment and there is no reliable data to assess costs associated with such a clean up effort. In contrast, considerable testing has been done on the application of potassium to the soil to block the uptake of Cs-137 in this environment.[53] The reports cited by SCA indicate potassium applications reduce the cesium uptake by a factor of ten. Where concentrations are higher, this technique would be ineffective. Additionally, potassium does not "clean-up" the soil, it simply blocks the uptake of the cesium. Applications would have to continue until natural processes (primarily radioactive decay) reduced the radioactivity to acceptable levels.

Soil removal is a tested technology, and was utilized by the U.S. in Enewetak in past cleanup efforts. However, it involves the excavation and disposal of significant volumes of contaminated soil. An important drawback to this alternative is the attendant ecological disruption which results from the removal of the topsoil from the environment. Both SCA[54] and Enviropro[55] remark on this problem. Nonetheless, based upon our review of the proposed alternatives, it is clear that soil removal must be at least a component of the cleanup strategy.

The estimates of volume of contaminated soil involved range from approximately 1.5 million cubic meters[56] to about 1.9 million cubic meters.[57] SCA devised a unit cost analysis for costs of cleanup based upon, in part, extensive analysis conducted by the Bikini Atoll Rehabilitation Committee. The unit cost for removal and replacement[58] of soil on Enewetak was estimated to be $101 per cubic meter. However,

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[53]Claimants' Exhibit 46 contains an eleven page appendix assessing the effectiveness of potassium spreading in the critical environment. The references include articles by Dr. William Robison, relating to his work with potassium applications on Bikini Atoll.

[54]Claimants' Exhibit 45 at p. 90.

[55]Defender of the Fund's Exhibit SS at p. 49.

[56]Enviropro, Defender of the Fund's Exhibit SS, Table 4.2.2-2.

[57]Claimants' Exhibit 45, p. 46.

[58]The replacement soil is from dredging the lagoon. There is no significant organic component, and consequently this replacement soil may not be regarded as constituting a return to agricultural

that does not include the cost of disposal of the contaminated soil. Off island disposal unit costs ranged from $262/cubic meter[59] to $13,790/cubic meter[60], while on-island disposal costs ranged from $9.09/cubic meter[61] to $377/cubic meter[62]. Clearly, any reduction in the volume of soil removed would result in significant cost reduction as well as reduction in the attendant ecological disruption. One such reduction may be achieved by acknowledgment of the shielding and dilution effect contributed by replacement fill. Based on this reasoning, SCA estimates the volume of soil needed to be removed would be reduced to about 470,000 cubic meters.[63] As noted above, the application of potassium may be an effective technique for reduction of exposure, but only up to certain concentrations of Cs-137. If that strategy is utilized in conjunction with soil removal, the volume of soil which would have to be removed is reduced to approximately 223,000 cubic meters.[64] This works out to a cost for soil removal of $22 million.[65]

While the material costs for application of potassium over the required amount of time are relatively modest, there are other associated costs. SCA reports:

> In addition to the basic cost of treating soil with potassium/fertilizer, a sound soil management program is imperative. For Enewetak Atoll, such a program would require the full-time oversight of a qualified agronomist and the support of at least two field technicians. All soils would be subjected to standard tests that ensure the proper soil treatment quantities of potassium or potassium fertilizer. More importantly, all soil and food crop samples would also be subjected to radioanalytical tests that assess the persistence of Cs-137 in soil and in food crops and provide quantitative data for demonstrating the effectiveness of suppressing plant uptake of Cs-137.
>
> As a final test for ensuring the effectiveness of Cs-137 in food crops, the resettled population group would be requested to undergo an annual in vivo-bioassay (i.e., whole

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productivity.

[59]At Envirocare, Utah (Claimants' Exhibit 46, Table 4-11, p. 4-34.)

[60]At Barnwell, South Carolina, (Claimants' Exhibit 46, Table 4-11, p. 4-34.)

[61]Dumped in the lagoon, (Claimants' Exhibit 46, Table 4-11, p. 4-34.)

[62]Entombed in a crater with concrete dome, (Claimants' Exhibit 46, Table 4-11, p. 4-34.)

[63]Claimants' Exhibit 45, Case #2, Table 14a, p. 54.

[64]Claimants' Exhibit 45, Case #3, Table 14a, p. 54.

[65]Claimants' Exhibit 45, Case #3, Table 14b, p. 55.

body count with potential urinalysis).[66]

These costs are imperative to insure the safety of the returning residents and are properly included in the cost of cleanup. Both SCA[67] and Enviropro[68] agree that the length of time for application of the potassium treatment would be on the order of 100 years. SCA estimates the present day cost[69] of potassium treatment in Enewetak over this time period would be $15.5 million.[70]

A necessary component of the clean up effort is radiological surveys. While past surveys at Enewetak have gathered much data, they are neither current, nor complete in regard to the support of the clean up effort. A characterization survey consisting of field measurements and laboratory analysis is required to provide information as to the exact location and nature of the contamination to allow compliance with guideline levels. An on-going remedial action support survey will be needed to support the clean up effort while it is being performed. Finally, a survey to insure that areas subjected to remediation have met required clean-up levels must be conducted. The cost of these surveys is $4.51 million.

As noted above, a major component of the cost of soil removal is disposal. The parties considered a number of disposal options, including lagoon dumping, ocean dumping, disposal (with no waste stabilization) on an uninhabited island in the atoll, use of contaminated soil as back fill to extend atoll land mass, construction of a causeway, crater entombment, and disposal in the U.S. SCA provides unit cost estimates for each of these alternatives.[71] Enviropro determined the cost under four different

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[66]Claimants' Exhibit 46, p. 4-46.

[67]"Due to the 30 year half-life and persistence of Cs-137 in the soil, soil treatments may be required as long as 100 years." Claimants' Exhibit 46, p. 4-39.

[68]"Our assessment indicates that the technology will require implementation betweeen a minimum of 64 years and a maxium estimate of 127 years." Defender of the Fund's Exhibit XXX, p. 52.

[69]The hundred year cost is discounted at 7% per year.

[70]Claimants' Exhibit 45, Table 27, p. 85.

[71]Claimants' Exhibit 45, Table 22, p. 74.

disposal scenarios: two causeway scenarios - direct fill and cement mix; dumping in the Marianas Trench; and shipping the soil to Nevada for storage. While it is difficult to directly compare the two parties' expert analyses, it may generally be observed that disposal in the U.S. will be more expensive than local disposal of the contaminated soil. Additionally, while dumping the contaminated soil in the lagoon may be the most inexpensive alternative, it may be ruled out on the basis of legal and political concerns about ocean dumping of radioactive waste. The same is true of dumping in the Marianas Trench.

While Enviropro sets out its conclusions relating to costs, the basis for its calculations were not set out in the Report, nor were they adequately explained in testimony at hearing. In contrast, SCA provided the background for determining costs through the unit cost methodology, basing its calculations on established, cited references. The calculations were reinforced through testimony, subject to cross examination, at hearing.

While the causeway alternative is not the least expensive option, it more fully protects the residents from risk of harm from exposure to radiation compared to other feasible local disposal options. The major pathway for exposure is ingestion of foods, particularly plants, which have absorbed radioactive substances from the soil. A causeway would separate the contaminated soil from agriculturally productive areas, protecting the people from exposure. While the option of on site disposal at an uninhabited island of the atoll may be less expensive, no site has been identified that would be appropriate on Enewetak or where the land owner would consent to such disposal. In the estimates of cost for such disposal, no component for compensation to the landowner for use of the land was identified. Finally, it is clear that such option is not the preferred disposal option of the people of Enewetak.[72] While such preference is not dispositive in consideration of disposal options, it is a factor to be considered. Crater entombment may have the virtue of precedent behind it, but rather than enhance the productivity of the community, as in the case of the causeway, it requires a site which would be

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[72] "A third on-island disposal option that has the support of the Enewetak people and is recommended by the authors of this statement is the use of excavated soil in the construction of a causeway." Claimant's Exhibit 45, p. 74.

withdrawn from potential productivity. Like the use of an uninhabited island, no site has been identified, nor has the cost of compensating landowners been addressed. The cost of this option, $84.7 million[73] is more than that of the causeway option favored by the Enewetak people. The Tribunal finds that the most effective disposal alternative is the causeway option, at a cost of $31.5 million.[74]

Although the primary radioactive isotope of concern is Cesium 137, on the island of Runit (the fifth largest island of the atoll), there is residual Plutonium 239, resulting from the Fig and Quince tests conducted there. Radiation levels on Runit exceed the limit and it remains quarantined from use by the people of Enewetak. Techniques now exist to clean up this plutonium, utilizing soil sorting methods applied at Johnston Atoll, and dissolving the coral soil to separate out the Plutonium for disposal. The cost of this is $10 million.[75]

E. Soil Rehabilitation and Revegetation

In addition to the costs of removal of contaminated soil and its disposal, the land must be restored to productivity. The backfill provided to replace removed soil would be dredged from the lagoon and would not contain sufficient organic material to be agriculturally productive. Enviropro acknowledges the problem, but does not provide any specific remedy, other than to note it will take 25-50 years for the land to become fertile.[76] Claimants offer two options to rehabilitate the soil. One is to import topsoil from off island, potentially Kosrae or Ponape. The unit cost would be $40,062/acre. The other is to rehabilitate the soil through agricultural means as described by Mr. Mateariki, in his report filed as an exhibit in this action[77] and in testimony before the Tribunal. This approach would restore the soil through natural means, utilizing local resources and involving land owners and a local work force. The method has been tested by Mr. Mateariki on Enewetak. The unit cost for this approach is estimated to be

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[73]Claimants' Exhibit 45, Case #3, Table 14b, p. 55.

[74]Claimants' Exhibit 45, Case #3, Table 14b, p. 55.

[75]Claimants' Exhibit 45, p. 102.

[76]Defender of the Fund's Exhibit XXX, p. 49.

[77]*Initial Report*, Teairki F. Mateariki, Claimants' Exhibit 130.

$29,000 per acre, although it is acknowledged that it would take up to 50 years to completely restore the land to the level where it is self sustaining.[78] However, the import option would not include the cost of revegetation or maintenance and care. Additionally, there is the concern that imported soil may introduce foreign pests or plants inappropriate to the Enewetak ecological system. The cost for soil rehabilitation and revegetation of affected lands is the $17.7 million requested by claimants.[79]

F. Resettlement

The parties take divergent views of resettlement as an element of compensation in this claim. Claimants' position is that the requested resettlement costs

> . . . are crucial to put the Enewetak people in a situation similar to their situation prior to their relocation in 1947. They are unable to engage in their traditional economic activities (copra production, fishing, agricultural exports, etc.) Because of the residual radioactivity on their atoll and the perception in the marketplace that it is contaminated. Until the soil rehabilitation and revegetation is complete (a process that will take decades), the Enewetak People have no means to pay for housing and other infrastructure necessary to enable them to live. Their protracted exile on Ujelang also prevented them from engaging in any economic activity, and thus precludes them from being able to pay for any of the necessary resettlement costs.

The cost of this resettlement, by claimants' calculation, is over $52 million.[80] This would provide for residences and community infrastructure on Enjebi Island (once it has been restored to radiological safety) and additional upgrade of facilities on Enewetak, Medren and Japtan Islands. The Enjebi portion of the plan includes 100 residences which would consist of masonry construction, treated wood roof trusses with aluminum roofing, three to four bedrooms, two internal baths, an interior kitchen, a septic system, a water storage system, a water connection to the central distribution line, a connection to the central power plant and a salt water flushing system. There would be a central power and water plant with two

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[78]Claimants' Exhibit 45, p. 94.

[79]Claimants' Exhibit 210.

[80]Claimants Exhibit 137, *Enewetak Atoll Revised Master Plan Concept for Enjebi Island and Upgrade and Restoration of Facilities at Enewetak, Medren and Japtan Islands*, prepared by E.P.G. Corporation.

250 KW generators and two 5,000 gallon per day water makers. A power distribution system would carry electric power to residences and service areas. There would be a water storage and distribution system including two 50,000 gallon lined concrete tanks, and a fuel storage facility consisting of two 20,000 gallon diesel tanks and one 10,000 gallon mogas tank, as well as a dispensing facility at the storage area. The community infrastructure would include a 4,000 foot compacted coral runway and a new LCU ramp at the dock area. The resettlement costs include a 4,000 square foot maintenance building, a 4,000 square foot warehouse, an 864 square foot airport terminal, a 1,152 square foot port control and communications building and a 5,000 square foot field station. Also included are a number of community buildings: a 2,400 square foot council house, a 3,200 square foot multi-purpose building for community activities, a 6,000 square foot school, a dispensary, a church, a public safety building a recreation facility (outdoor basketball court, softball field, volleyball court, and soccer field), and a 6,500 square foot staff and visitors complex consisting of an eight unit apartment complex.

Although housing and facilities on the southern islands were provided in 1980, claimants assert a general upgrade and restoration of these is required as part of resettlement. This includes expanded power and water services to all residential areas, improvement of the airport, docks and fuel storage systems. The 116 houses completed in 1980, as part of the original resettlement program will require $25,000 in repairs and upgrades including repair of walls, doors and windows, new roof coating, and a new kitchen and bath.

In response, the Defender of the Fund argues that "Resettlement costs are equivalent to the replacement value of the item at the time and place of destruction and nothing more."[81] While no evidence has been introduced as to the value of community residences and facilities in 1947 when the people of Enewetak were removed, it seems evident that value would be considerably less than the costs of resettlement set out by Claimants. This difference in approach springs from a differing understanding of what restoration entails. Claimants' position relies upon a view that restoration is not limited to a

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[81]POSTHEARING SUBMISSION RE: VALUE OF UJELANG; AWARD OF RESETTLEMENT COSTS OF ENEWETAK ATOLL, filed November 11, 1999, p. 2.

restoration of the physical conditions that existed at the time of their relocation in 1947, but rather must be extended to consider the economic condition of the community as a whole. The goal of restoration, in addition to environmental rehabilitation, must be "to create the infrastructure and conditions that will allow the Enewetak People to pursue economic opportunities with about the same possibility of success as they had prior to their relocation."[82] The Defender of the Fund takes a much narrower view, asserting that the resettlement costs are limited to replacement of those structures which were present at the time of relocation.

Little evidence has been introduced on the exact status of the Enewetak people immediately preceding their relocation. In arguing for significant resettlement costs, claimants allow the inference that they were a self-sufficient, subsistence based community in 1947. However, what evidence is available suggests that the community was in a poor, dependent condition following the hardships of war time control by the Japanese and subsequent liberation after the U.S. invasion. Dr. Carucci reports:

> Local people were thankful to be alive after surviving the strafing and invasion of the atoll. They were fed and given clothing. But, in the descriptions of Ujelang residents in the 1970s, the war did not end on Enewetak. Local people were also placed in exile on the small islet of Aoman in order to allow the United States to continue their use of the main islets of Enewetak. Subsequently they received permission to expand their settlement to the neighboring islet of Bijili and to fish the waters along the northern fringe of their own atoll. . . . In comparison to the times that would follow, this era is recalled in relatively positive terms. People were fed, clothed and given tools and materials to build homes and canoes. Yet, people did not control their own lives. They could not sail from place to place at will. They could no longer fully subsist on their land. Indeed, the very shape of that land changed shape. . . [83]

This calls into question the baseline for establishing restoration.

The Tribunal agrees with claimants that the economic situation of the community is an important element of consideration in the overall structure of compensation in this case. However, it disagrees that this element of damage should be addressed through the type of resettlement costs proposed by claimants.

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[82]POSTHEARING SUBMISSION OF THE PEOPLE OF ENEWETAK ON (1) THE VALUE OF THE USE OF UJELANG AND(2) LEGAL AUTHORITY FOR RESETTLEMENT COSTS, filed November 11, 1999, p. 11.

[83]Claimants' Exhibit 147, p. 10.

The economic values inherent in the request for claimants' resettlement costs are addressed through the award for loss of use. As stated in the joint appraisal report, the loss of use value addresses "compensation for the economic loss to the people of Enewetak for the period that use of their land has been denied.."[84] Claimants assert they have no way to pay for housing and other infrastructure because their exile on Ujelang denied them the opportunity to conduct economic activity and thus precludes them from paying resettlement costs. This acknowledges that in the absence of this denial of economic activity, the people would expect to pay for their own housing, as is the normal course of events. The loss of use award provides compensation for this loss of economic opportunity. While the lands of the atoll may not be fully productive, claimants' award for loss of use includes compensation not only for past loss, but also for loss of future use. To allow additional compensation for resettlement costs on the order of those requested by claimants would amount to a duplicative award.

Claimants argue that these costs have already been approved by the U.S. and that consequently sets the legal standard for resettlement costs However, to the extent that the resettlement program is an element of the overall U.S. program of direct compensation to the Enewetak people, that approach does not include compensation identified for denial of use of the land by the people. The two approaches are exclusive of each other, at least to the extent that resettlement is proposed by claimants. Claimants may not receive compensation for the economic loss attendant to the denial of use of their land, and then receive resettlement costs which are justified by those same economic losses.

G. Restoration Damages

To summarize, the reasonable costs of clean-up and rehabilitation are as follows: soil removal - \$22,500,000; potassium treatment - \$15,500,000; soil disposal (causeway) - \$31,500,000; Fig/Quince clean-up - \$10,000,000; surveys - \$4,510,000; soil rehabilitation and revegetation - \$17,700,000.

The sum of these is \$101,710,000. This total must be adjusted by the amount of the Enjebi Trust Fund, which the parties stipulated to be \$10,000,000. Restoration damages for clean up and rehabilitation of Enewetak total \$91,710,000.

[84]Joint Appraisal, p.4.

V. Hardship

The Tribunal heard compelling testimony from individual members of the Enewetak community about the relocation to and conditions on Ujelang. In April of 1999, the Tribunal heard testimony of community members specifically addressing the hardships on Ujelang. Those testifying included Samson Yoshitaro, James Gideon, Ms. Rennie Robert, and Senator Ishmael John. The Tribunal also heard from Dr. Laurence Carucci, for the claimants and Dr. Nancy Pollock, for the Defender of the Fund. The Tribunal also heard from Mayor Neptali Peter, Councilman James Gideon, Obed, and Yoshitaro Elijah in January of 1997. Although the 1997 hearing was addressing the loss of use issue, some of the testimony related to the time on Ujelang.

The witnesses painted a bleak picture of conditions on Ujelang, particularly from the early 1950's until the 1970's. Dr. Carucci notes:

> There are a number of forms of evidence that show how serious the suffering was on Ujelang during these years. First, are many similar versions of the stories that elders told on the atoll in the mid-1970's. While stories of suffering are virtually innumerable, those that are repeated again and again focus on a number of core incidents including famine and hunger, near starvation and death from illness, food shortage and the limitations of the environment on Ujelang (fishing/collecting), the polio epidemic, the measles epidemic, the rat infestation, the time of the strike, and easing of suffering during the 1970s but with continued homesickness and desire to return to Enewetak.[85]

The testimony of the witnesses reinforced this broad statement. Samson Yoshitaro told of the food shortages, how there was so little food and supply ships so infrequent that they were forced to harvest immature pandanus and breadfruit and eat the relatively small amounts of copra they had produced for sale. He told how they had no breakfast, would gather what they could for lunch and have fish and arrowroot for supper. He also related how there were so many rats that the people competed with rats for food, and that the rats would "eat your hands." James Gideon told how so much time was spent in the lagoon getting food, mainly clams, that men's hair turned reddish.[86] He told how the copra was eaten

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[85]Claimants' Exhibit 147, p. 14.

[86]Dr. Carucci notes that while the people attributed this reddish-blondish hair coloring to too much time in the sun, the discolored, frazzled appearance is characteristic of malnutrition. Claimants'

by rats because it was so long between field trip ships. Ms. Rennie Roberts testified how the women had to use flour sacks for clothes. She lived in both Arno and Ujelang as she grew up and she found greater hardships on Ujelang. She told of the polio epidemic in 1956 and 57, which she learned of from her parents and grandparents. Some mothers had to nurse two children because one mother would have no milk. Senator Ishmael John testified how the people didn't want to go from their homeland to Ujelang when they were relocated. In the early years there was not a food shortage, even though the ships were infrequent. The shortages started in 1956. From 1956 to 1972 was the worst suffering. Dr. Carucci [87] relates the following from a woman in her forties, told to him in 1978, near the end of a food shortage. Although lengthy, it is recounted in full to capture the fullness of the hardship experienced by the people:

> We, perhaps we (endeared, inclusive) are very hungry now with people sailing here and there throughout the atoll to search for food, and with everyone digging arrowroot, consuming pikukkuk (an arrowroot-based Wojlan food), and scraping coconuts too unripe for harvesting from their shells with their teeth (because the copra-stage coconuts are gone), and with everyone eliminating shit so watery it evaporates or seeps into the sand, with many people sick and some of the babies nearing death, but things are still O.K. The young ones call this a famine (nita), but in comparison with the times of the past, this is just a severe hunger.
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> (Meditates) . . . Those times previously were difficult days on Wojlan, for then, the times of hunger, of real famine, were more frequent than the times of health. God have mercy on us (kapokwekej). Many children and old ones died as a result of those times of danger. Tebij, the man who is the grandfather of Paul and Mahten, well, he was one of those who died on account of the famines. And infants, well there were so many who disappeared (died), you could not count them. Their stomachs stuck out like they were bloated, and you would never think that they were hungry. Full; as you looked at them you would think they were very full. But, in fact they were hungry. And their stomachs were soft all the time, and when they deficated, it was just water, hot foamy water that winnowed away into the sand. Just like nowadays. But they would get hot fevers, then cold chills; hot fevers, then cold and sweaty. And then, in just a moment, they would be gone. Dead, they would never move again. Their life was gone. And, in

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Exhibit 147, p. 19.

[87]Dr. Carucci has spent four years residing with Enewetak and Ujelang people conducting research. A portion of that time was spent on Ujelang in the late 1970s. He notes that "the stories Enewetak people today tell of suffering on Ujelang, . . . lack the kind of depth, elaboration, and emotion that stories of the same events had in the 1970s. And, of course, this is because the experiences of those events are far more remote [today] than they were in 1976-78. At that time, people still knew what it was like to be hungry." Claimants' Exhibit 147, p. 15.

those days, the wailing across the village was constant. We grieved, but there was hardly time to feel sorry for those who died, for we had to try harder and continue working or else all of the others would die as well.

So, you see, when Tebij died, some members of his family had to pause and prepare for the funeral. Some women grieved, and a few of the men had to dig the grave. But, at the same time, while the men dug, others had to remain in the sea and collect food.. They had to redouble their labors because they would then fish for themselves and their own family as well as for the family of that other one, the one who had died. And, as you know, they were already in the sea from some time prior to the appearance of the sun until the sun once again dove (into the sea in the evening). There was no breakfast. The children would wake up crying, and they would never stop crying on account of their hunger. They would scrape coconut with their teeth until their stomachs were slightly filled but, at times, even the supply of coconuts were exhausted. You could scrounge around Jabonbok (the windward-most tip of Wojlan) until you were exhausted and find only one, perhaps two. Even the immature copra-stage nuts on the tallest coconuts in Jabonbok were gone, for the young men had already climbed them and stripped away their fruits.

And so, the infants would just cry, because there was no milk at their mother's breasts. Only the smallest quantity (of milk), but it was of no use because it was so watery – like rainwater. And the women would have to aojek, make an arrowroot-based jello, often just with water because there were no drinking coconuts, just to keep the infants from crying. If it was a good day, perhaps a woman's husband would come home by noon with a few fish, or if (he) had bad luck, perhaps a few clams. And, as you know, during these times of famine, fishing is very difficult. Everyone is in the sea from morning until night, and even on Ane-manot or Kalo (the islets furthest from Wojlan islet) there are inadequate numbers of fish. And even the fish that remain are easily frightened.[88]

These hardships were confirmed by the Defender's witness, Dr. Pollock. She notes in her report submitted to the Tribunal, about the period from the mid 1950s to 1971:

> It was a phase of great hardship for the people living on Ujelang. They experienced crop failures, shortage of fish in the lagoon . . . The infrequency and irregular field trip ships to buy their copra and sell them the food so badly needed was the second major concern reported . . . Their ability to purchase supplementary food was thus virtually non existent. "They were on the verge of starvation" [citation omitted]. As the population grew and field trip ships became more infrequent, so their plight increased through to 1971.[89]

Although the hardships associated with the relocation of the people of Enewetak to Ujelang have been characterized as "discomfort and annoyance" to be consistent with the formulation for compensation in the Second Restatement of Torts, it is clear that the conditions suffered by those relocated go far beyond simple annoyance. The Defender of the Fund has suggested that this category of damage would be more

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[88]Claimants' Exhibit 147, pp. 15-16.

[89]*A Perspective on Cultural Loss by the Enewetak People*, by Dr. Nancy Pollock, Defender of the Fund's Exhibit WW, p 4.

appropriately addressed through the Tribunal's personal injury program. The Tribunal disagrees. The Tribunal has previously stated in ruling on the Defender's MOTION TO LIMIT CATEGORIES OF DAMAGE in this case that:

> To the extent that these damages are the result of damages to property and arise out of a loss of use to that property , they are properly considered as consequential damages. We see, in general, the damages related to relocation as falling with in this category. However, to the extent that such personal interest damages may otherwise result from the Nuclear Testing Program, such as a medical condition caused by exposure to radiation from the tests, we agree with the Defender that they should properly be pursued through a Section 23(13) or (14) action.[90]

This class action is the appropriate vehicle to address these damages because it is so closely related to the underlying subject matter of land damages. These damages, which were suffered on a community wide basis differ from those typically addressed in the personal injury program, which are basically radiogenic diseases, linked to exposure to radiation from the testing program. The injuries at issue here are those arising out of the relocation to Ujelang and the hardships endured there by the people because of its remoteness and lack of adequate resources to support the population sent there. The damages are a consequence of the loss of their land and their relocation attendant to that loss. Further, it makes sense from the point of judicial economy to consider these damages with the land damages because they arise out of the same factual situation and involve the same community of claimants. Finally, based upon the NCTA, any award of this nature for personal injuries would be made to the local distribution authority[91], which will determine an appropriate distribution of the award.

The Tribunal will adopt the approach suggested by claimants for quantification of these damages, by paying an annual amount for each person on Ujelang for each of the thirty three years between 1947 and 1980 the people of Enewetak were on Ujelang. The population numbers are those set out in Claimant's Exhibit 203. Although these numbers reflect projections, they are based on data collected by Dr. Carucci, as explained in his testimony, and reflects the best numbers available to us. In determining

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[90]DECISION AND ORDER, In the Matter of the People of Enewetak, NCT No. 23-0902, August 11, 1995, pp. 8-9.

[91]42 MIRC 123(17)(b)(iii).

the annual amount, it must be acknowledged that not all people suffered the same degree of hardship (as revealed by the dietary information set forth by Dr. Carucci and Mary Maifeld,)[92] and the level of hardship was not uniform over the period of years the people of Enewetak were residing on Ujelang. Nonetheless, it is clear that the remoteness of Ujelang, the relative lack of resources and scarcity of food, and the separation from the people's traditional homeland were all factors that the population on Ujelang shared. The Second Restatement on Torts requires damages to be established with certainty.

> One to whom another has tortiously caused harm is entitled to compensatory damages for the harm if, but only if, he establishes by proof the extent of the harm and the amount of money representing adequate compensation with as much certainty as the nature of the tort and the circumstances permit.[93]

Under the unique circumstances of this claim, the requisite certainty has been met. Those circumstances include the length of time that has passed between the time of the harm and the opportunity to present evidence on that harm and the fact that the delay was not the fault of the people of Enewetak. Another factor is the statutory framework under which their claim is being heard.

In determining the amount of compensation for these sufferings, the Tribunal has considered not only the cases cited by counsel, but also the Tribunal's personal injury program. Under that program, the maximum award for a claimant is $125,000 for serious medical conditions most likely to lead to death. In order to be fair and consistent to all personal injury claimants, an individual should not receive hardship damages which exceed this amount.

As has been described by the witnesses, the relative hardships suffered on Ujelang varied with time. However, there was general agreement that the period of approximately 1956 to 1972 was the period of greatest suffering. For this period of 16 years, an annual per person amount is determined by the Tribunal to be $4,500. For the remaining 17 years, preceding and following this period, the annual amount is $3,000. This means that an individual who was present on Ujelang for all thirty three years would receive $123,000. The Tribunal acknowledges that this amount is somewhat arbitrary and cannot fully repay those who suffered on Ujelang. The Tribunal can only echo the court in Mochizuki v. US:

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[92]Claimants' Exhibit 147.

[93]*Restatement on Torts Second*, Section 912.

> No compensation is ever equivalent to a serious human loss. Who among us would ever trade our eyes or legs for $5,000 or $20,000 of a hundred times that much? Money damages can never undo the loss of life, false imprisonment or the passage of years. Money, however, is the medium which the law must use as it seeks to wright the wrongs. It must use this medium with the full recognition that it is never truly adequate.[94]

Based upon the annual population figures for thirty three years, starting in 1947 and ending with the return to Enewetak in 1980, and the appropriate per annum amount, the damages for the hardships during the relocation to Ujelang amount to $34,084,500.

VI. Conclusion

With this decision, the Tribunal makes its first award for damages to property. Through the process, the Tribunal has heard testimony from the people of Enewetak and from expert witnesses from both Claimants and the Defender of the Fund. It has reviewed voluminous reports and documents. It has had the benefit from the arguments of counsel. The Tribunal has determined that the people of Enewetak, the claimants in this case, have suffered loss and injury to their property and to their persons. While the Tribunal is charged with the determination of these damages, the claimants have suffered damage beyond that which money can compensate. The destruction and disruption of their community and the attendant life style and values cannot be compensated with an award of dollars. The passage of time and changes in culture preclude a return to the way things were half a century ago. While that which was lost may be priceless, it does not mean it was without value; nor does it justify an award which is not firmly based in fairness and reasonableness.

The Tribunal has determined the amount of compensation due to the claimants in this case is **$324,949,311**. This includes $199,154,811 for past and future loss of use of Enewetak Atoll to claimants. It further includes $91,710,000 to restore Enewetak to a safe and productive state. Finally, it includes $34,084,500 for the hardships suffered by the people of Enewetak as a result of their relocation attendant to their loss of use.

ORDER

Based on this decision, it is hereby ORDERED that a hearing shall be set for post-judgment

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[94] Mochizuki v. US, 43 Fed.Cl. 97 (1999) at p. 97.

proceedings, including a determination of annual funding pursuant to 42 MIRC 123(17)(b)(iii)(B).

Dated this 13th day of April, 2000 at Majuro, Marshall Islands.

/s/ Oscar De Brum

OSCAR DEBRUM
CHAIRMAN

/s/ Gregory J Danz

GREGORY J DANZ
MEMBER

/s/ James Plasman

JAMES PLASMAN
MEMBER

BEFORE THE NUCLEAR CLAIMS TRIBUNAL

REPUBLIC OF THE MARSHALL ISLANDS

In the Matter of the People of Enewetak, et al., Claimants for Compensation	NCT No. 23-0902

ORDER

On April 13, 2000, the Tribunal issued a MEMORANDUM OF DECISION AND ORDER in this claim, determining that the amount of compensation due to the people of Enewetak for damage to property resulting from or arising out of the U.S. Nuclear Testing Program was $324,949,311. This amount included $17.7 million for soil rehabilitation and revegetation of affected lands. On April 26, 2000, Claimants filed a MOTION TO AMEND MEMORANDUM OF DECISION AND ORDER FILED ON APRIL 13, 2000, requesting the Tribunal include in its determination the entire costs necessary to rehabilitate all the lands on Enewetak. Based upon the amount and the exhibit cited by the Tribunal in its MEMORANDUM OF DECISION, Claimants assert that the $17.7 million identified by the Tribunal included amounts only for soil rehabilitation and revegetation of the southern islands and 392 acres of the northern islands where no soil scraping is required for radiological clean up. The lands which will require removal of contaminated soil will require an additional $16.1 million for soil rehabilitation and revegetation.

Because of the manner of presentation of the costs of rehabilitation in Claimants' exhibits, the Tribunal did not include the funds necessary for soil rehabilitation and revegetation for those lands where soil removal is a part of the restoration methodology. It was the intent of the Tribunal to include an amount sufficient to restore the lands of Enewetak to productivity. In some sense, these lands are where the need for soil restoration and revegetation is most compelling.

The Defender of the Fund filed a "non-opposition" to Claimants' motion on May 3, 2000.

THEREFORE, it is hereby ORDERED, that the Tribunal's MEMORANDUM OF DECISION AND ORDER of April 13, 2000 is AMENDED to include an additional $16.1 million as the cost to restore the soil and revegetate the 558 acres subject to soil removal as part of the radiological cleanup, thus bringing the total amount of damages to $341,049,311.

Dated this 5th day of May, 2000.

/s/Oscar de Brum

OSCAR DEBRUM
CHAIRMAN

/s/Gregory J. Danz

GREGORY J. DANZ
MEMBER

/s/James H. Plasman

JAMES H. PLASMAN
MEMBER

BEFORE THE NUCLEAR CLAIMS TRIBUNAL

REPUBLIC OF THE MARSHALL ISLANDS

In the Matter of the People of Enewetak, et al., Claimants for Compensation	NCT No. 23-0902

ORDER

On April 13, 2000, the Tribunal issued its DECISION AND ORDER in this claim, awarding damages in the amount of $324,949,311. In that decision, the Tribunal ordered a hearing be set for post judgment proceedings. On April 26, 2000, claimants filed a MOTION TO AMEND MEMORANDUM OF DECISION AND ORDER, requesting the inclusion of certain rehabilitation costs. The Defender of the Fund did not oppose this MOTION and on May 5, 2000, the Tribunal issued an ORDER amending its April 13 DECISION to include an additional $16.1 million for soil rehabilitation and revegetation. On May 26, 2000, a hearing was held and a briefing schedule established for examination of the outstanding issues of post-judgment interest and attorneys fees and costs. The parties filed their respective briefs in a timely manner and on June 6, 2000 filed a stipulation dealing with future loss of use, prior compensation, and prejudgment interest. At the Tribunal's request, the parties filed on July 21, 2000, a REVISED STIPULATION RE FUTURE LOSS OF USE, PRIOR COMPENSATION AND INTEREST.

Stipulation

The parties offered a REVISED STIPULATION RE FUTURE LOSS OF USE, PRIOR COMPENSATION, AND INTEREST, filed July 21, 2000 to address certain issues in the Tribunal's decision. The stipulation as to future loss of use incorporates a calculation which utilizes total of 1104.16 acres as opposed to the 1305.78 acres employed in the appraisal initially submitted to the

Tribunal. This change reflects the parties' agreement as to the proper acreage which will be denied to claimants' use in the future. The prior compensation portion of the stipulation reflects the inclusion of certain annual payments under the Section 177 Agreement ($3.25 million received by claimants in 1997, 1998, and 1999) which were not included in the calculations adopted in the Tribunal's April, 2000 DECISION. In the April 2000 DECISION, the Tribunal determined the value of the future loss of use (adjusted for Section 177 payments) to be $50,154,811. Based upon the STIPULATION, this value would change to $47,001,908.[1] The bases of the stipulation are reasonable and will be adopted.

The final portion of the STIPULATION relates to pre-judgment interest, from the date of the loss of use calculation, January 24, 1997, to the date of entry of the decision, April 13, 2000. The rate of interest agreed to by the parties was 7 percent. The amount of interest to which the parties stipulated was $47,681,122. The inclusion of interest to the date of the decision is appropriate and consistent with the methodology utilized by the parties in assessing the loss of use to claimants.

Attorneys Fees

This issue was extensively briefed by the parties in 1995. The Tribunal's ORDER of December 7, 1995 addressed the matters raised in claimant's MOTION for attorneys fees and costs filed June 19, 2000. The December 1995 ORDER allowed the Claimants to introduce evidence relating to attorneys fees incurred by the People of Enewetak in the prosecution of their claims against the U.S. for damages from the U.S. nuclear testing program in the Pacific before the U.S. Court of Claims prior to the effective date of the Compact of Free Association. Claimants have been unable to develop evidence to support this part of the claim in the time since that ORDER and the Tribunal does not believe that additional time will reasonably lead to the discovery of additional evidence supporting this aspect of the claim. The Tribunal further declines the invitation to award attorneys fees for attorneys fees before the Tribunal prior since its inception and prior to the amendment to the Nuclear Claims Tribunal Act by P.L. 1993-56,

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[1]Present value of future rents ($60,387,552) less present value of future Section 177 payments ($13,385,644) as of January 1997.

which removed the authority of the Tribunal to award attorneys fees.

Post-Judgment Interest

It seems clear that were this a determination of just compensation in a taking action against a governmental body, post judgment interest would be awarded. However, as noted in the Tribunal's DECISION AND ORDER of April 13, 2000, while principles of just compensation may be referenced in determining what is necessary to make claimants whole, this is not an eminent domain proceeding. "Neither the U.S. nor RMI government is a party to this action, and consequently certain elements in a determination of just compensation are not present." (MEMORANDUM OF DECISION AND ORDER, April 13, 2000, p. 3)

The Tribunal, in making its award of damages, has evaluated the harm suffered by claimants and issued an award. The funds available for payment of that award are far short of the amount awarded. Assuming the existing compensation framework, payment of award would be made over a period of years from the annual proceeds of the Section 177 Fund. Even under the most optimistic of scenarios, with the funds currently available, full payment of the award would take over 100 years. Unlike a just compensation case where the award may be enforced against a governmental entity, the Tribunal has a limited fund and an award of interest could arguably only dilute further the funds available for payment.

An award of interest in this case could be seen to work unfairly toward personal injury award recipients to whom interest is not awarded. Because of the structure of the funding mechanism, the Tribunal is forced to make pro rated payments of awards from the annual proceeds of the Fund. If post judgment interest were to be a component of these payments, the administrative burden of constantly recalculating unpaid awards would be significant.

Nonetheless, it is clear that whatever the value of the award, it will decline over time as inflation takes its toll. In the absence of post judgment interest, claimants who receive property damage awards at different times will be unequally treated in that the value of the later awards will be greater due to the passage of time and effect of inflation. If funds were available to pay property awards upon their entry, this would not be a problem. However, the longer it takes to make final payment, the less the actual value of the award. The absence of post judgment interest would have the effect of penalizing claimants who receive an award earlier than those who come later in the process. While it could be argued that personal injury defendants may be unfairly treated if property claimants' awards include a post judgment interest component, there are some significant differences between the personal injury awards and property damage awards.

Property taken by the government without just compensation is subject to constitutional remedies. Personal injuries by the government are not similarly protected. Recipients of personal injury awards from the Tribunal have been the beneficiaries of a statutory presumption which relieves them of the burden of proving their injury was caused in fact by exposure to radiation from the nuclear testing program. The effect of this presumption is to be over inclusive, so that some of those receiving personal injury awards have suffered from injuries which were not in fact caused by the testing program. Property damage claimants, on the other hand, have met a heavier burden of proof in relating their damage to the effects of the testing program. Arguably the absence of post judgment interest is the price of the presumption.

The Defender of the Fund correctly notes that there is no specific statutory authority for including post judgment interest in the award. However, the Nuclear Claims Tribunal Act provides:

> In determining the proper award of compensation, the Tribunal or the Special Tribunal, whichever is the decision maker, shall, in accordance with Section 2 of the Section 177 Agreement, take into account the validity of the claim, any prior compensation made as a result of such claim and such other factors as it may deem appropriate.[2]

In the case of property damage claims, the Tribunal deems the inclusion of post judgment interest to be appropriate in the following manner. It will be applied to the loss of use and restoration portions of the award, but not the hardship portion of the award. The hardship damages, although arguably consequences of the damage to property, are more in the nature of personal injuries and not subject to the same considerations as those damages which are more closely related to a just compensation claim.

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[2] 42 MIRC §112.

The possible inequities of post judgment interest between personal injury and property damage claimants will be addressed through the payment schedule. The total loss of use damages for past and future loss of use amount to $244,000,000,[3] while the total cost of restoration is $107,810,000.[4]

ORDER

1. The REVISED STIPULATION is accepted and the Tribunal's April 13, 2000 DECISION is AMENDED to reflect future loss of use damages of $47,001,908 rather than $50,154,811 and the addition of prejudgment interest in the amount of $47,681,122.

2. Claimants' MOTION for attorneys fees is DENIED.

3. Claimants' MOTION for post judgment interest is GRANTED as follows: interest in the amount of 7% per year is awarded on the loss of use damages of $244,000,000 and on restoration damages of $107,810,000.

Dated this 3rd day of August, 2000.

/s/Oscar de Brum

Oscar de Brum
CHAIRMAN

/s/Gregory J. Danz

Gregory J. Danz
MEMBER

/s/James Plasman

James Plasman
MEMBER

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[3] REVISED STIPULATION RE FUTURE LOSS OF USE, PRIOR COMPENSATION, AND INTEREST, filed July 21, 2000, Table 7A-2.

[4] This includes the $91,710,000 awarded in the April 13, 2000 DECISION, and the $16,100,000 from the Tribunal's May 5, 2000 ORDER, amending the April 13 DECISION.

ATTACHMENT VI: MEDICAL ANALYSIS

Current Inadequacies and a Future Proposal to Adequately Address Medical Needs Resulting from the US Nuclear Weapons Testing Program in the Republic of the Marshall Islands

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EXECUTIVE SUMMARY

The United States Government has taken responsibility for the deleterious health consequences of the U.S. Nuclear Testing Program in the Marshall Islands through the Agreement for the Implementation of Section 177 of the Compact ("Section 177 Agreement"). However, the impact of the nuclear weapons testing program on the health and well being of the Marshallese people far exceeds the present capacity and provisions of the Compact. Current programs, which are designed to care for radiogenic illnesses and the health consequences of nuclear weapons testing, are limited in scope and resources. The gross inadequacy of current programs to address the adverse health consequences of the U.S. Nuclear Testing Program represent a "changed circumstance" requiring immediate redress.

The U.S. Nuclear Testing Program adversely affected many more people than what was anticipated at the time of the 177 Agreement. Specifically, both the scope and complexity of health consequences associated with the testing is much greater than what was known at the time of the Compact. All people who were exposed to significant levels of radiation or whose health was adversely affected by the nuclear weapon tests require access to the best available "US Standard" of primary, secondary, and tertiary health care services, including specialty care for radiogenic illness. This model is consistent with a program mandate from the US Congress in 1980 PL 96-205, Sec 106 (a), which specified "...a program of medical care and treatment... for any injury, illness, or condition which may be the result directly or indirectly of such nuclear weapons testing program."

The World Health Organization (WHO) defines health as a "state of complete physical, mental and social well being, and not merely the absence of disease or infirmity." With this definition in mind, the composite health consequences of the nuclear weapons testing program were far more devastating than the cancers, beta burns, and thyroid abnormalities commonly associated with ionizing radiation injury. Dislocating people from their traditional lands, contaminating the resources and lands the people depend on for subsistence and survival, drastically altering community structure, and changing dietary and nutritional patterns negatively affect the well being (livelihood, traditions, dietary intake, mental health, immune system, cultural identity, community organization) of the Marshallese people.

The health consequences of the U.S. Nuclear Testing Program extend beyond individual physical injury, as it has affected families, communities, and will affect future generations. All programs and assistance for the affected communities should be designed to address the multiple tiers of injury and damage resulting from the testing program.

The Compact resources designated for those affected by the testing program have not been utilized to build the RMI's capacity to respond to the health consequences of U.S. Nuclear Testing Program. The majority of the affected population still does not have access to timely and appropriate standards of health care. They continue to acquire health care through the RMI health care system, which has insufficient medical supplies, facilities, and qualified personnel.

It has been, and will be, impossible to provide adequate health services to the affected population without improving the existing hospitals, health facilities, and health care infrastructure in the local RMI environment. Provision of health programs for affected people outside of the RMI medical system is not cost effective, is unsustainable, and leaves the affected populations without or with substandard health care services. Future planning and funding must develop and sustain the RMI health systems effort to deliver comprehensive and culturally tailored health care services to the affected populations.

It is necessary to address the composite health consequences of the U.S. Nuclear Testing Program with a health system that can provide U.S. standards of health care. The operational cost of such a system is approximately 45 million dollars annually, and there is an initial 50 million dollars in capitol costs. Technical assistance from U.S. Government health agencies and the US Public Health Service (National Health Service Corps) will also be necessary. The long-term health consequences resulting from the testing program require a commitment of operational funds for the next 50 years.

Careful planning will ensure accountability and the best health care for those affected by the U.S. Nuclear Testing Program. The cost involved in establishing an adequate health care program to address radiation related illnesses in the Marshall Islands is significantly less than pursuing the same level of care in the United States. This paper presents the most cost effective, culturally appropriate, and technically competent health model to adequately respond to radiation and nuclear testing related health care needs in the Marshall Islands. The model is consistent with the Compact of Free Association's goal of developing sustainable institutions in the Marshall Islands.

1.0 MEDICAL SERVICES AND MEDICAL MONITORING PROGRAMS PROVIDED BY THE US GOVERNMENT FOR PEOPLE AFFECTED BY THE U.S. NUCLEAR TESTING PROGRAM

Currently, the Compact of Free Association and the 177 Agreement provide medical service and medical surveillance programs to RMI communities affected by the U.S. Nuclear Testing Program. These services are provided through the Department of Energy Medical Monitoring Program and the 177 Health Care Program.

1.1 The U.S. Department of Energy Medical Monitoring Program

Section 103(h) of the Compact "provide(s) special medical care and logistical support" to the people who were present on Rongelap and Utrik atolls during the Bravo test on March 1, 1954. The Department of Energy program also provides medical care to a comparison population. Although members of the comparison group were not exposed to the Bravo fallout in 1954, they were resettled on Rongelap along with the Bravo victims at a time when residual radiological contamination of the atoll was unexpectedly high and resulted in additional exposures to the resettled population.

Brookhaven National Laboratory (BNL) was contracted by DOE to provide medical care to those exposed to the Bravo detonation and to the comparison group. The BNL program, however, did little to build the local RMI capacity to monitor or treat radiation related medical problems.

In 1998, the RMI and the DOE jointly developed a more comprehensive health care delivery program for the affected population. They awarded the administration of the medical program to a medical team from the John A. Burns School of Medicine, Straub Hospital and the Pacific Health Research Institute in Hawaii. The program strategies include:

1. Providing preventative and innovative healthcare for the mandated population to improve health.
2. Providing monitoring and care for tertiary illnesses (usually in Hawaii).
3. Enhancing continuity of health services.
4. Establishing a community advisory process for the program.
5. Delivering healthcare in a culturally appropriate fashion.
6. Coordinating other health agencies in the RMI to leverage assets and improve overall service.

The original design of the DOE program had been to monitor and treat only radiogenic illnesses. All other health care was delegated to the 177 Health Care Program. The new program design has been developed because the 177 Program could not meet the health care needs of the DOE patients. The new program has been innovative, culturally sensitive, and has enhanced local health care delivery and development. The direction the DOE medical programs have taken is appropriate and medically sound.

1.1.1 *Funding*

The DOE allocates $1.1 million per year for direct health care costs[1] plus $800,000 per year for logistics costs . This amount represents a $713.19 per person per month (PPPM) expenditure. The $713.19 PPPM is adequate to screen for and treat radiogenic illness. However, this sum is not sufficient to provide adequate primary, secondary health, and tertiary health care for the affected population.

1.2 <u>177 (Four Atoll) Health Care Program</u>

The 177 Health Care Program provided in the 177 Agreement is designed to provide primary, secondary and tertiary medical services to the people of Enewetak, Bikini, Rongelap and Utrik islands who were affected by the U.S. Nuclear Testing Program. This includes most of the people enrolled in the DOE medical program. The 177 Health Care Program's design was developed through the U.S. Public Health Service (USPHS) in 1985. Dr. Charles Hostetter, a commissioned officer of the USPHS from the Region IX Office, oversaw the writing and design of the medical program. From 1985-1987, John Short and Associates (JSA) administered the Four Atolls Health Care Program. From 1987 to the present, Mercy International has administered the 177 Health Care Program. The U.S. Department of Interior (DOI), through project officer Terry Kline, had overseen the JSA program. The DOI continues to monitor the Mercy International Administered 177 Program.

The design of the program by the U.S. Public Health Service is laudable, having essential elements of primary, secondary and tertiary medical care. However, delivery of what was proposed by the USPHS has been impossible because of limitations in funding. Unlike virtually every Compact program provided by the U.S. Government, there has never been an inflation adjustment to offset increasing costs of healthcare since 1985. The program, as designed and funded, serves only to create great expectations without providing the means and infrastructure to accomplish what it was intended to do by the USPHS and the U.S. Congress.

1.2.1 *Program Membership*

The 177 Health Care Program has been severely criticized because the eligibility criteria for membership are thought to be inappropriate which results in over-enrollment. During the

[1] Two-thirds of DOE's discretionary budget is devoted to environmental monitoring and logistical support for the environmental and medical monitoring programs. Only one-third of DOE's annual budget for Compact related programs in the RMI is expended on medical care and medical surveillance.

implementation of the Four Atolls Health Care Program in 1985 the DOI, JSA, and the people of the four atolls agreed on a mechanism to determine program eligibility. All involved parties recognized that the people who lived on these atolls at the time of the U.S. Nuclear Testing Program could most reasonably determine who was affected by the nuclear testing. The leadership (senators, mayors and council members) from these atolls was given the task of determining who was eligible for membership in the program. The DOI, the administrative organization, and the people from the affected atolls all agreed to the process.

Although the 177 healthcare membership is much larger than expected, all parties adhered to the rules and process established to determine program eligibility and membership. There was no violation of the process through which membership was determined. From a Marshallese perspective, leaders of the four atolls believe that family members and people with land rights on the affected atolls who were not physically present on those atolls at the time of the U.S. Nuclear Testing Program should be eligible to participate in the 177 Health Care Program. Although these individuals were not present on their home islands during the tests, residual contamination and resettlement meant that these individuals were denied access to the land and natural resources they had rights to and needed access to in order to maintain their health and well being.

The DOI and JSA made erroneous assumptions about the membership eligibility. They assumed that the leadership of the four atolls would limit membership since the program had a fixed budget. Therefore, individual members would receive more benefits if fewer members were enrolled. They also assumed that the four atoll leaders shared the same thinking, as to what constituted eligibility, with the DOI and JSA. The assumptions made by DOI and JSA did not take into account Marshallese culture, land tenure systems, and traditional kinship responsibilities. Marshallese decision making and functioning is more inclusive than exclusive in nature. Therefore, a finite amount of money is shared among anyone perceived as affected. The four atoll leaders maintain that the health of individuals with kinship ties or land rights to the affected atolls are adversely affected by the U.S. Nuclear Testing Program (Refer to section 4.3.2).

In addition to the four atoll populations enrolled in the 177 Health Care Program, the Nuclear Claims Tribunal (NCT) has the ability to enroll patients to the program. The NCT makes awards to individuals determined to have radiogenic illness who are not from one of the four atolls, and enrolls these individuals into the 177 Health Care Program. To date, the NCT has enrolled more than 550 people in the 177 Health Care Program.

1.2.2 *Funding Inadequacy*

The 177 Health Care Program, with a budget of 2 million dollars annually, has been grossly underfunded. It cannot deliver an appropriate level of health care with the financial resources allocated. Provision of tertiary care services (off island health care that cannot be provided in the RMI) has been grossly inadequate. Tertiary care (off island referrals) is not made available for 7 to 10 months out of each year. Furthermore, secondary health care (inpatient and hospital based healthcare) has been delegated to a current RMI hospital health system that is not equipped to provide the appropriate level of inpatient care for the 177 population. Hence, the people of the 177 Health Care Program have been subjected to a substandard level of primary, secondary and tertiary healthcare services since the program's inception.

Nearly all members of the DOE group (section 1.2.1) also belong to the 177 program. The 177 program is designated to meet the non-radiation related healthcare needs of this population. With an annual budget of 2 million dollars, the 177 Healthcare Program has been grossly underfunded and thus has also failed to adequately meet the routine health needs of the DOE patients.

The chart below illustrates what it would cost per person per month (PPPM) to achieve basic levels of primary, secondary and tertiary health care in the United States as compared to the 177 Health Care Program. These figures, calculated by Mercy International, are based on 1997 Health Care Dollars and do not reflect increased health care costs during the past three years.

PROGRAM	(PPPM)
U.S.	
Commercial Population	$135
Medicare (Nebraska)	$221
Medicare (New York)	$767
Medicaid (Michigan)	$120
HCFA	$293
RMI	
Section 177	$13.60*

*The PPPM for the RMI is calculated as follows: $2 million dollars annually, divided by 12,259 patients, divided by 12 months equals $13.60 PPPM.

If the membership were cut by two thirds, then the figure of monthly expenditures would be $41.66 ($2 million/4000 people/12 months), still much less than the U.S. health care expenditures.

If we assume that the appropriate health services could be purchased in the US for the 12,259 members of the 177 program and we applied US Health Care Financing Administration (HCFA) rates @ $293.00 PPPM, then the cost of the 177 Health Care Program would be (293x12259x12mos), or $43,102,644 per year. This figure could easily double when adding travel, logistical support, and room and board costs in the US.

The expenditures of the US health care insurance companies and third party payers is based on the premise that appropriate primary, secondary, and tertiary healthcare services are available in close proximity to the patient. Because the health care system of the RMI is developing or lacking, many of the required primary and secondary healthcare services are inadequate and tertiary health care services must be purchased outside the RMI. If the medical care provided to the people who were affected by the U.S. Nuclear Testing Program is expected to meet US standards of care, there are two options. One, the health services could be provided in the United States, i.e. treating the affected people on site in Hawaii, or two, the RMI health capacity could be upgraded to meet the need of the target population.

Investing in the RMI health infrastructure and supplementing the tertiary care budget is cost effective and will provide the best health care alternative to the nation for several reasons. First, such an approach would represent true development and capacity building of the health system and not mere health service delivery. Second, the economy of scale would result in the system being able to care for a greater number of affected people, on site, at a lesser cost. Third, all present and future generations affected by the U.S. Nuclear Testing Program and living in the RMI would receive appropriate health care within the local infrastructure. Finally, the health care delivery to all people living in the RMI would improve.

Currently, adequate healthcare services cannot be purchased in the RMI. Adjusting current levels of funding for inflation will not approach the level of funding required to bring adequate healthcare services to the target population. The funding required to deliver an appropriate level of health care in the U.S. for the 12, 259 members of the 177 program would be at least $43 million per year. It is in the best interest of both the US and the RMI to develop the local health infrastructure in order to deliver the appropriate level of health care necessary.

1.2.3 *Organizational and Structural Inadequacies*

The 177 Health Care Program, as it was implemented, created many administrative problems for the RMI Ministry of Health and Environment and the U.S. Government.

The 177 Program fostered an expectation that the U.S. would provide primary, secondary and tertiary care for the victims of the U.S. Nuclear Testing Program. When this expectation could not be fulfilled, because of funding and health infrastructure inadequacies, the patients in the 177 Health Care Program justly became frustrated and angry.

The patients enrolled in the 177 Health Care Program cannot have their health care needs met in the existing program. As a result, the financial inadequacy of the program has become the burden of the RMI Government as it is forced to devote its limited resources to the healthcare needs of patients in the 177 Health Care Program. For example, the 177 Health Care Program budgeted $412,515 for out of country (tertiary) medical referrals in 1997 and 1998. The referral monies were expended within 3 to5 months of the beginning of the respective fiscal year. The RMI government absorbed the financial and logistics burden of the 177 medical referrals for the last seven months of 1997 and 1998. Mercy International, the administrators of the 177 Program, estimates the annual deficit for 177 membership off island referrals is between 1.5 to 2 million dollars annually. (Hutchinson, 1999) Monies that should have been utilized to support the medical needs of the general non –177 Marshallese population were utilized to support the 177 Health Care Program. The quality and delivery of healthcare throughout the nation is adversely affected by the gross underfunding of the 177 Health care program, a burden which the RMI Government should not be forced to assume.

The structure and design of the 177 and the DOE (prior to 1998) medical program fostered a victim and dependency mind set in the people it served. The 177 program does not allow full community participation in health care promotion and has not positively affected the capacity for development or self-reliance in health. As such, the 177 health service delivery programs have a great potential for promoting dependency. The 177 program perpetuates a model of health that is destructive to the RMI and people it serves.

From a health model perspective, the 177 and DOE programs are oriented towards health service delivery. The delivery of "stand alone" health care services is direct and expedient. However, the overall impact on health service from service delivery programs is transient and often does little to promote long-term health outcomes in that community.

The 177 Health Care Program duplicates existing services in the RMI, and is not a cost effective method to utilize limited health resources. Additionally, the creation of a parallel system of health care to the RMI local systems creates a multi-tiered, unequal system of health care.

The ideal program should target development of a single system of healthcare that is capable of providing special services necessary to the populations affected by the U.S. Nuclear Testing Program. To this end, full integration of health programs for radiation affected peoples is essential. The affected communities should be partners in developing, implementing, and sustaining these programs.

1.3 Medical Surveillance and Monitoring of the people affected by the U.S. Nuclear Testing Program beyond the four atolls

Medical surveillance for radiogenic illness in affected populations is required by the Compact and 177 Agreement. There has been no systematic medical surveillance of radiogenic illnesses in the general RMI population, or in the people belonging to the 177 Health Care Program. The inherent inadequacies of medical surveillance make it very difficult to evaluate the likely existence of elevated rates of radiogenic illnesses in the RMI. More importantly, this lack of medical monitoring has precluded the opportunity for early diagnosis and treatment of cancer and other radiogenic illnesses. The obligation to provide medical care for the adverse consequences of the U.S. Nuclear Testing Program cannot be met without comprehensive medical monitoring of populations previously exposed to ionizing radiation.

In a 1998 report by the U.S. Institute of Medicine on Health Care in the US Associated Pacific Countries, it was recommended that monitoring for health effects associated with radiation exposure be done in all U.S. Associated Pacific Islands, with special attention given to the RMI. U.S.

funded medical surveillance to date, however, has been restricted to the DOE mandated population and the "control" group, that in total number 239 people. As discussed below, entire populations exposed to large doses of ionizing radiation have never been medically monitored.

Monitoring affected populations for health effects other than radiogenic illness was also not done. As described in section 5.0, the events surrounding the nuclear testing (dietary, cultural, psychological, emotional stresses) had direct effects on the health of the affected people. A systematic attempt to treat these conditions did not arise until 1985 with the advent of the Four Atoll Health Care Program.

Neither the DOE nor 177 health care programs systematically assessed the rates of diabetes, hypertension, mental illness, depression, and nutritional deficiency in their designated populations or in the RMI's general population. Lack of monitoring confounds the ability to understand the relationship between these chronic illnesses and the testing program. Medical monitoring and screening, in all populations affected or potentially affected, is crucial to understanding and treating the true health consequences of the U.S. Nuclear Testing Program.

Developing the 177 program as a separate program outside the RMI Ministry of Health and Environment (MOHE) created an administrative dilemma. The 177 program was a parallel health structure with separate medical records and different medical protocols. There continues to be administrative discord between the 177 program and the MOHE. Nevertheless. it would be feasible to integrate healthcare for the affected population into the RMI Health Care System.

2.0 WHO WERE THE POPULATION GROUPS AND WHAT WAS THE EXTENT OF THEIR RADIATION EXPOSURES RESULTING FROM THE U.S. NUCLEAR TESTING PROGRAM IN THE RMI?

Historically, the Rongelap and Utrik people present on their home atolls at the time of the Bravo hydrogen bomb detonation were the only Marshallese citizens designated by the DOE as "exposed" to deleterious levels of ionizing radiation. Radioactive ash from the hydrogen bomb Bravo test fell directly on these people causing visible beta burns to the skin and resulting in the classical clinical signs and symptoms associated with high acute radiation doses. The populations from Rongelap and Utrik were subsequently evacuated to Kwajalein and enrolled in Project 4.1, a medical study of the effects of ionizing radiation on human subjects.

Radioactive fallout from the Bravo test, however, did not end abruptly at Rongelap and Utrik Atolls. Nevertheless, the US Department of Energy maintains that only the peoples of Rongelap and Utrik atolls received deleterious doses of ionizing radiation from the U.S. Nuclear Testing Program. However, recent admissions by the DOE and the availability of newly declassified documents provide evidence that many more people (i.e., other than those on Rongelap and Utrik) received significant external and internal exposure of ionizing radiation from the U.S. Nuclear Testing Program.

For example, 1954 data (Breslin and Cassidy 1955) suggest that the radioactive BRAVO cloud that passed over Ailinginae, Rongelap, Rongerik and Utrik also passed over other atolls and resulted in large individual doses. The likelihood of this potentially significant exposure has been only recently admitted by the DOE. In a 1997 journal article, Cronkite et al. (Cronkite 1997 - page 177) stated the following:

> "The bulk of the native populations within 500 nautical miles (NM) resided in the southeast quadrant out of fallout area. The clouds with radioactive particles passed over Ailinginae, Rongelap, Utrik, and Ailuk depositing fallout and irradiating the persons below from the radioactive cloud (cloud shine)." [Emphasis added.]

While the Marshallese on Ailinginae, Rongelap, and Utrik were evacuated at H+58 hours, H+51 hours, and H+55 to 78 hours, respectively, from these atolls, the people living on Ailuk were not evacuated. The likely magnitude of radiation exposure and DOE's failure to evacuate have also been admitted, albeit in modest terms (Cronkite et al. 1977, page 178):

> "On nearby Ailuk Atoll, about 400 natives with about the same or lesser dose at Utrik were not evacuated." [Emphasis added.]

The reason(s) for this tragic lapse in exercising the U.S. Government's responsibility to protect the people of the Marshall Islands can be inferred from the following statements (Cronkite 1997, page 176):

> "During previous atomic tests, natives were protected by temporary relocation [before the test]. Gordon Dunning, AEC Division Biology and Medicine (DBM) stated, "the main objection to evacuation is the high cost and the logistic problems presented in supporting such an operation." CJTF-7 concurred emphasizing the military financial austerity for 1954 and the lack of ships and aircraft." [Emphasis added.]

2.1 Population Exposures Associated with BRAVO and Other CASTLE-Series Nuclear Weapon Tests

Information only recently declassified by the DOE and made publicly available provides quantitative evidence that many more atolls and their indigenous populations received large doses of radiation associated with fallout from a series of nuclear tests identified as CASTLE Series. Estimates of external radiation doses for locations representing 26 atolls/islands were cited in a 1955 report issued by the Atomic Energy Agency (Breslin and Cassidy 1955). These data are summarized in Table 1. From the data, it is clear that, in addition to Rongelap and Utirik Atolls, fallout from BRAVO and the other five weapon tests resulted in large doses at numerous other atolls, many of which were inhabited at the time of testing. Doses of this magnitude clearly have the potential for giving rise to radiogenic illnesses (inclusive of cancer) that are discernable in a monitored population.

To put these radiation doses into perspective, it may be helpful to point out that the maximum radiation dose resulting from the highly publicized 1979 accident at the Three Mile Island Nuclear Generating Station was estimated at less than 100 mrem (Behling 1986, NCRP 1987).

Lastly, it must also be stated that the doses cited in Table 1 and acknowledged by the AEC/DOE are not only low but incomplete. Deficiencies and errors associated with these and other previous dose estimates are analyzed in detail in a recently completed reassessment of radiation doses associated with BRAVO fallout (Behling et al., May 2000)[2]. Key findings of this comprehensive study pertaining to external exposure, internal exposure, and thyroid exposure are briefly summarized below.

<u>External Exposures</u>. Previous estimates (as cited in Table 1) were based solely on post-fallout survey measurements of ground contamination. Excluded from these measurements/dose estimates were the large contributions to dose from (1) cloud shine, (2) cloud immersion, and (3) residual skin/clothing contamination.

The dose reassessment study concluded the external whole-body radiation doses from BRAVO alone was about twice the dose estimated by the AEC/DOE.

<u>Internal Exposure</u>. Fallout exposure dose estimates cited in Table 1 only reflect external radiation doses that resulted from fallout deposition on ground surfaces. The visible snow-like fallout representing more than 100 radioactive nuclides, however, also deposited on food products and cistern water as reported by the AEC (Sharp and Chapman 1957). Internal radiation exposure from the inhalation of airborne fallout and the ingestion of contaminated food and water were estimated to have resulted in doses of 600 to possibly more than 1,000 rem committed effective dose equivalent (CEDE) for persons exposed on Rongelap (Note: 1 rem is equal to 1,000 mrem).

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[2] This report titled <u>Reassessment of Acute Radiation Doses Associated with BRAVO Fallout</u> by U. H. Behling, J. Mauro, and K. Behling was presented in May of 2000 to the DOE, EPA, and CDC for peer review.

Table 1. CASTLE Series: Cumulative Doses (mrem) by Event and Location

Location	BRAVO	ROMEO	KOON	UNION	YANKEE	NECTAR	TOTAL Dose (mrem)
Rongerik	190,000	9,000	5,000	550	1,400	280	206,000
Rongelap	180,000	11,000	6,000	3,400	1,700	300	202,000
Ailinginae	60,000	3,400	3,300	8	600	70	67,000
Bikar	60,000	3,000	1,200	650	1,700	150	67,000
Utirik	22,000	1,200	700	100	330	50	24,000
Taka	15,000	800	1,000	120	380	50	17,000
Ailuk	5,000	410	110	100	500	20	6,140
Wotje	1,800	300	200	13	220	10	2,543
Likiep	1,700	170	80	30	200	16	2,196
Jemo	1,200	410	130	18	200	20	1,978
Wotho	250	270	110	55	95	4	784
Erileib	390	200	50	--	--	7	647
Arno	60	200	300	8	25	1	594
Majuro	200	200	50	20	--	1	471
Mili	60	160	200	20	--	1	441
Jaluit	20	300	70	8	--	3	401
Taongi	280	60	10	10	10	--	370
Ebon	20	250	50	8	25	--	353
Aur	40	200	50	8	40	3	341
Kili	20	200	70	--	--	1	291
Ailinglapalap	7	140	100	8	--	--	255
Namorik	20	160	70	2	--	--	252
Nami	2	90	100	--	25	--	216
Lae	6	12	12	8	78	95	125
Ujae	6	32	17	10	48	1	114

Thyroid Doses and Thyroid Health Effects. Among the more than 100 radioactive species that represent fallout from nuclear weapons are several radioisotopes of iodine and their parent nuclides (i.e., Te-131m; Te-132, I-131, I-132, I-133, I-134, and I-135).

Several past studies of Marshall Islanders have shown a large excess of thyroid pathologies that include thyroid nodules and cancers as well as complete loss of thyroid function (Howard et al. 1997, Takahaski et al. 1997, Larsen 1978).

These studies found that the high incidence of thyroid pathologies among the Marshallese were not confined to inhabitants of Rongelap and Utirik Atolls, In fact, a report published by the Journal of American Medical Association in August 1987 described an inverse correlation between thyroid nodules and the distance from the Bravo detonation site (Hamilton, 1987). The linear inverse relationship suggests that the fallout from the Bravo test reached far beyond Rongelap and Utrik. The fallout patterns caused radioactive contamination of 14 atolls resulting in excess cases of thyroid nodules to the peoples of those atolls (Rongelap, Utirik, Mejit, Ailuk, Likiep, Wotje, Maloelap, Lae, Ujae, Wotho, Kwajelein, Jaluit, Ebon, and Mili). Notably, there were no other known risk factors that could explain the observed rates of thyroid nodules.

Over the years, medical scientists familiar with thyroid pathologies and their dose-response relationship to radiation have questioned the inconsistency between the observed incidence of thyroid health effects and previous estimates of thyroid radiation doses by the DOE. Among those who have questioned the validity of DOE's thyroid dose estimates include the highly respected National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation (NAS BEIR Committee). In its most recent report (BEIR V, 1990), the Committee raised the following concern:

> *"The thyroid status of the Marshall Islanders 27 years after exposure is summarized in Table [3.1-7, not shown here]. Although the dose estimation is open to question, the prevalence of hypothyroidism, thyroid nodules and proven thyroid cancer all appears to increase with dose . . . "* [Emphasis added.]

Years earlier, at a 1978 conference sponsored by the International Atomic Energy Agency (IAEA), clinical data were presented pertaining to the observed cases of hypothyroidism (i.e., thyroid ablation) among the Marshallese exposed to BRAVO fallout (Larsen 1978). A panelist at the conference raised the following question regarding the observed clinical data and their thyroid doses as estimated by the DOE (Larsen 1978, page 113):

> *"I wonder what reliance can be placed in the doses you report, because I do not believe that 1000 rads, or 1500, would have been enough to suppress the hormonal activity of the thyroid gland of two children*

contaminated when they were one year old. In fact, to obtain such a result, doctors have to administer a dose of ^{131}I giving at least 100,000 rads." [Empahsis added.]

The recently completed study (Behling 2000) critically evaluated previous estimates of thyroid doses (as well as external and other internal doses) associated with BRAVO. This review identified gross errors and deficiencies and concluded that previous thyroid dose calculations underestimated thyroid doses 10- to 20-fold.

In summary, new evidence exists that is linked to recently declassified documents that post-date the 177 Agreement and support the following three conclusions:

(1) In addition to the "exposed population groups" identified in the 177 Agreement, there are other atolls and population groups that experienced large external and internal doses of radiation.

(2) The magnitude of external and internal doses previously estimated and acknowledged by the DOE have been grossly underestimated. Empirical evidence in support of this claim comes from documented clinical studies of thyroid health effects in which the very existence of hypothyroidism and high incidence of thyroid nodules/cancers far exceed the estimated magnitude of individual thyroid doses and the magnitude of population thyroid doses previously estimated by the DOE.

(3) Finally, it is reasonable to conclude that a comprehensive (i.e., RMI-wide) monitoring program would confirm an elevated incidence of other radiation-induced cancers similar to those observed for thyroid health effects.

2.1.1 What are the health risks of ionizing radiation?

A reassessment of radiation exposures that provides a more complete and accurate quantification of radiation doses for the Marshall Island population is critically important to address questions related to radiation health risks for a specific individual as well as for an entire exposed population.

Our ability to accurately predict radiation-induced health effects is the result of a voluminous body of scientific studies that spans nearly a century and to date remains under intense investigation. Nearly two decades ago (i.e., in 1981), the U.S. General Accounting Office reported that more than 80,000 separate scientific studies had been conducted on the health effects of radiation at an estimated cost of $2 billion. In fact, the National

Academy of Sciences in its 1980 BEIR III Report states that "... it is fair to say that we have more scientific evidence on the hazardous of ionizing radiation than most, if not all, other environmental agents that effect the general public."

On the basis of scientific studies that largely involve human populations (such as the Japanese A-bomb survivors of Hiroshima and Nagasaki), estimates of risks per unit dose of radiation have been defined for fatal and non-fatal cancers in behalf of the specific tissues/organs of the body (e.g., NCRP 1985, NCRP 1993, NCRP 1997, NRC 1985, EPA 1994, EPA 1999). Estimates of risks have also been defined for other radiation-induced health effects include genetic effects, in-utero effects, fertility/sterility, life-shortening, etc. (BEIR V 1990, NCRP 1987, UNSCEAR 1982, UNSCEAR 1988, UNSCEAR 1993, UNSCEAR 1994).

2.1.2 *What is the risk of cancer?*

For obvious reasons, a comprehensive treatment of radiation health risks is beyond the scope of this discussion. However, Table 2 provides a simple overview of the fatal and total (i.e., fatal and non-fatal) cancer risks when the radiation dose is external, uniformly exposes the entire human body, and is delivered over a period of several days or more. Table 2 corresponds to the fatal and total cancer risk coefficients of 5×10^{-4} cancers/rem and 7×10^{-4} cancers/rem, respectively. (These risk coefficients represent consensus values that have been formally adopted by the (1) National Academy of Sciences BEIR Committee, (2) National Council on Radiation Protection and Measurements (NCRP), the International Committee on Radiation Protection (ICRP), the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the U.S. Environmental Protection Agency (EPA), the U.S. Nuclear Regulatory Agency (NRC), and the U.S. Department of Energy (DOE).

Table 2. The Risk of Cancer Associated with Chronic Whole-Body External Radiation Exposure

External Whole-Body Dose	Probability of Cancer	
	Fatal	Fatal and Non-Fatal
1 rem (1,000 mrem)	1/2000 (or 1 chance in 2000)	1.4/2000 (or 1 chance in 1430)
10 rem (10,000 mrem)	1/200 (or 1 chance in 200)	1.4/200 (or 1 chance in 143)
100 rem (100,000 mrem)	1/20 (or 1 chance in 20)	1.4/20 (or 1 chance in 14)
200 rem (200,000 mrem)	1/10 (or 1 chance in 10)	1.4/10 (or 1 chance in 7)

2.1.3 What is the value of a medical monitoring program?

Table 2 reveals that under conditions of chronic whole-body external exposure, the risk of cancer increases proportionately with dose. Moreover, these risk coefficients can be applied to individuals as well as to an entire population that has been exposed to radiation. For example, the previous Table 1 cited external whole-body doses (as estimated by the DOE for the CASTLE Series inclusive of BRAVO test). Without questioning the validity of these doses, a person exposed on Rongelap who would have received about 200,000 mrem (or 200 rem) of external whole-body exposure would have a lifetime risk of dying from a radiation-induced cancer of one chance in ten. Equally, if a hundred people had each been exposed to 200 rem (corresponding to 20,000 person-rem), we would expect 10 people within this group of 100 to die of radiation induced cancers; in addition, we would also expect four non-fatal cancers.

From data presented herein, it is clear that radiation doses resulting from the U.S. Nuclear Testing Program have undoubtedly resulted in large collective population doses. On the basis of consensus risk coefficients, it is reasonable to assume that these exposures have resulted (and will continue to result) in additional cancers. Without a comprehensive monitoring program, early detection and timely treatment of these radiogenic cancers are being denied to the Marshallese people.

2.2 Unaccounted Radiation Exposures: Operation Redwing and Operation Hardtack

The RMI Government is still unable to access hundreds of classified documents that contain information that is crucial to understanding the extent of exposure to ionizing radiation throughout the Marshall Islands. Operation Redwing in 1956, comprising 17 detonations equal to 20.8 megatons, and Operation Hardtack I in 1958, comprising 33 detonations equal to 28 megaton, had a combined yield greater than the Castle series mentioned in the previous section. The impact and the path of radioactive fallout from these weapons tests remains largely unknown. Based on the composite power (megatonage) of the testing, it is reasonable to assume that the contamination of Operations Hardtack and Redwing would have further contributed to the cumulative radiation burden imposed on the people of the Marshall Islands.

2.2 Clean up and Early Resettlement Exposures

Several Marshallese populations were exposed to excess levels of ionizing radiation as a result of clean up efforts and resettlement of highly contaminated areas.

Marshallese citizens and other nationals participated in testing programs and the cleanup of radioactive materials on the two ground-zero atolls, Bikini and Enewetak. These workers were neither monitored nor afforded radiological protection provided to U.S. Service personnel and radiation workers as required under regulatory standards. Presently, this group of people, known as the Marshall Islands Radiation Victims Association (MIRVA), represents more than 500 individuals.

In Rongelap, people who were both present on Rongelap in 1954 for the Bravo test as well as those later designated as the comparison or "control" group resettled Rongelap Island in 1957. Rongelap was known to have significant radioactive contamination of land and local foods when the population resettled in 1957. All those who resettled Rongelap had significant and avoidable levels of internal radiation exposure from living and eating in a highly radioactive environment. Additionally, people from Rongelap Atoll distributed local foods contaminated with cesium-137 to family and kin throughout the Marshall Islands (Johnston and Barker 1999).

The people of Bikini were also resettled prematurely on their home islands. The islands contained high levels of radioactive contamination in the soil and food chain at the time. As a result of their premature resettlement, the Bikinians ingested large amounts of radioactive cesium from their environment. The Bikinians were moved off their home island a second time as a result. Thus, living and eating in contaminated environments resulted in avoidable, deleterious and long-term internal radiation exposure to the resettled populations of Rongelap and Bikini.

3.0 SUMMARY OF PEOPLE EXPOSED TO DELETERIOUS DOSES OF IONIZING RADIATION FROM THE U.S. NUCLEAR TESTING PROGRAM CONSTITUTES A "CHANGED CIRCUMSTANCE."

It was not until after the effective date of the Compact and the 177 Agreement that the RMI Government discovered many people, outside the scope of U.S. funded programs for radiological health care, were exposed to deleterious doses of ionizing radiation. When the U.S. funded programs for radiogenic injuries and damages, vast amounts of pertinent data about the U.S. Nuclear Testing Program remained classified.

The additional populations who were exposed to potentially deleterious doses of ionizing radiation include:

a. people involved with nuclear waste clean up
b. people prematurely resettled to Bikini
c. people prematurely resettled to Rongelap
d. people living on the atolls affected by the Castle series of tests
e. people living downwind of the Bravo tests – 14 atolls (Hamilton 1997).

To date, there are still numerous classified documents from Operations Redwing and Hardtack that prevent the RMI and the U.S. Congress from having a comprehensive understanding of the nature and extent of the ionizing radiation exposure to people and atolls of the RMI.

On May 11, 1999, US Congressman George Miller, through the Committee of Resources Oversight Hearing Status of Nuclear Claims Relocation and Resettlement Efforts in the Republic of the Marshall Islands, expressed a commonly held point of view that more people were exposed to ionizing radiation than has previously been acknowledged. He stated, "In February of 1994, I conducted a lengthy investigation and held a hearing because it had become known to me that many facts surrounding the nuclear weapons in the Pacific during the 1950's had been withheld from Congress, the people of the Marshall Islands, and the public. Information I had received prior to the 1994 hearing strongly suggested that many more people [than the original 267 people affected by the Bravo test] were affected by fallout and contamination of their homelands."

3.1 <u>The extent of ionizing radiation exposure and the composite health consequences of the U.S. Nuclear Testing Program could not have been reasonably identified as of the effective date of the 177 Agreement.</u>

a. Many pertinent documents regarding the testing remain classified by DOE and the U.S. Department of Defense after the date of the agreement.
b. Present scientific understanding of key parameters for deriving internal doses have significantly improved since the effective date of the agreement.

c. Medical studies that evaluated the geographic distribution of radiogenic illness (thyroid nodules) were completed after the date of the 177 Agreement.
d. New medical knowledge about the impacts of stress, trauma, cultural disruption, dietary disruption, and dislocation of people from land has led to a better understanding of the non-radiogenic health consequences of the U.S. Nuclear Testing Program after the date of the Agreement.

3.2 The extent of ionizing radiation exposure renders the provisions of the Agreement manifestly inadequate.

a. Thousands of people were exposed to significant doses of ionizing radiation from the U.S. Nuclear Testing Program. The U.S. Government erroneously designated the vast majority of these people as "unexposed." These people have received no medical screening or medical care for radiogenic illnesses.
b. The full extent and consequences of the ionizing radiation exposure from the U.S. Nuclear Testing Program is still unknown because numerous documents from Operations Hardtack and Redwing remain classified.
c. All levels of exposure to ionizing radiation pose a potential risk for developing cancer. The magnitude of risk is assumed to be directly proportional to the dose of radiation. Therefore, all of the peoples of the RMI who lived during the U.S. Nuclear Testing Program or who resettled contaminated islands have associated risks from developing or dying from cancer. These risks have never been addressed systematically.

The 177 Agreement did not adequately address the health needs of thousands of peoples who were exposed to ionizing radiation. Therefore, the DOE and 177 Health Care Programs are manifestly inadequate to provide for the health care needs related to radiation exposure from the U.S. Nuclear Testing Program.

4.0 SUMMARY OF HEALTH CONSEQUENCES OF THE U.S. NUCLEAR TESTING PROGRAM ON THE MARSHALLESE PEOPLE

4.1 Effects of the U.S. Nuclear Testing Program on Human Health

Health, as defined by the World Health Organization (WHO), is "a state of complete physical, mental and social well being, and not merely the absence of disease or infirmity." The idea of health as a holistic and practical view of wellbeing is used worldwide and forms the foundation for the "biopsychosocial" model of health. The previous "biomedical" model of health attributed illness to biological causes only (i.e. bacteria, trauma, physiological disruptions). The "biopsychosocial" model encompasses the impact of environmental, emotional, psychological and cultural stresses on each individual and community.

The WHO definition of "health" should be applied when considering the health consequences of the U.S. Nuclear Testing Program in the RMI. The ultimate question about health as it relates to nuclear weapons testing should be "what are the health consequences of the U.S. Nuclear Testing Program?" and not "what illnesses does ionizing radiation cause?"

The true health impact of the U.S. Nuclear Testing Program must consider the consequences inherent for people whose land, culture, home and kinship structure was destroyed by the U.S. Nuclear Testing Program. New medical knowledge about the impacts of stress, trauma, cultural disruption, dietary disruption, and dislocation of people from their land has led to a better understanding of the health consequences of the U.S. Nuclear Testing Program after the date of the 177 Agreement.

4.2 Physical illness and disease as a consequence of exposure to ionizing radiation.

4.2.1 Excess Cancer Burdens

A recent epidemiological study funded by the RMI Nuclear Claims Tribunal compared prevalence rates of cancers in the RMI to the surrounding Micronesia countries of Kiribati, Federated States of Micronesia, Nauru, and the Republic of Belau. The RMI has comparatively high rates of cervical, breast, thyroid, and genito-urinary cancers. Lung cancer rates were second to Nauru. There are limitations to such comparisons because of ascertainment bias in each Pacific jurisdiction. Nonetheless, the magnitude of difference in radiation related cancers, especially breast and thyroid, is striking (Palafox, 2000).

While such a study cannot determine whether or not the high rates of cancer were due to ionizing radiation from the U.S. Nuclear Testing Program, exposure to ionizing radiation can induce many types of cancers and potentially increase cancer rates in affected populations. Thyroid cancer rates are strongly associated with external doses of radiation as well as from internal doses associated with radioactive iodine.

4.2.2 Thyroid Disease from Ionizing Radiation Exposure.

Thyroid cancers, thyroid nodules and hypothyroidism can be caused by exposure to ionizing radiation. The RMI has very high rates for all three of these thyroid conditions.

The numerous thyroid nodules and cancers found in Marshallese living in the RMI during the U.S. Nuclear Testing Program is a matter of medical concern. The question arises, "Are the thyroid nodules and cancers found in Marshallese, other than Rongelapese and Utrikese, caused by the U.S. Nuclear Testing Program?" As part of the 1993 – 1997 Nationwide Radiological Study of the RMI, medical examinations located 43 thyroid cancers and 1,430 thyroid nodules in 4,766 people who were alive at the time of the Bravo detonation (Takahashi, 1999).

The number of thyroid nodules is greatest in people living closer to Bikini Atoll, the ground zero location for Bravo, and the rate of nodules decreases with increasing distance from Bikini. These findings are similar to Dr. Hamilton's findings (Hamilton, 1987). Hamilton's data suggests that radionuclides from the Bravo test extended far beyond Rongelap and Utrik and that thyroid nodules are linked to the U.S. Nuclear Testing Program.

The Marshall Islands Nationwide Thyroid Study reported that 37% of Marshallese alive during the Bravo detonation of 1954 developed thyroid nodules. Those born between the Bravo detonation and the end of the testing era (1954 to 1958) had a 23.9% rate of thyroid nodules. Those born after 1958 had a thyroid nodule rate of 12%. Though these studies were incomplete, high national rates of thyroid nodules during the testing era and lower rates after the testing era suggest a larger proportion of the RMI was contaminated with ionizing radiation than was initially disclosed. This data links the presence of thyroid nodules to the U.S. Nuclear Testing Program.

The study by Trott and Greenhouse, which utilized estimates of thyroid absorbed doses from Breslin and Cassidy tests in 1955 [corrected by Behling and Mauro], suggests that Ailuk, Likiep, Jemo, Mejit, Wotje and Wotho may have had significant exposure doses of radioiodines from the Bravo test (Takahashi, 1999). This exposure could cause an increase the incidence of thyroid disease.

4.2.3 Chronic Illness as a consequence

It is well documented that ionizing radiation exposure can cause direct burns, cancers, thyroid disease, fetal anomalies, fetal wastage, and anemia. Less is known, however, about the scientific studies surrounding the Hiroshima victims that document the number of hospital visits for hypertension, gastritis, ischemic heart disease, diabetes mellitus and bronchitis and the higher incidences of these illnesses in those exposed to radiation compared to the general public (Furitsu et al 1996).

The atomic bomb survivors from Hiroshima have a well-described illness called *Genbaku* (atomic bomb) *Bura-Bura* (lingering) disease. This illness has many subjective symptoms such as fatigue, vertigo, palpitations, and back pain. The symptoms of *Genbaku Bura Bura* are severe in the first 10 years after exposure; thereafter, the illness becomes less severe and chronic. The chronic form often manifests as increased susceptibility to colds, diminished immunity to illness, and prolonged recovery from illness.

Similar syndromes have been reported in workers of nuclear power plants in Japan, the downwinders of Hanford and other nuclear facilities in the U.S., and in the children of Chernobyl (Furitsu, 1996)). Although it is unclear why chronic illness and fatigue frequently occur in people exposed to ionizing radiation, the fact remains that these symptoms and illnesses are documented in radiation affected populations. Medical care should be provided for all illness associated with radiation exposure and nuclear testing.

4.2.4 *Genetic Effects*

The predominant sentiment among medical researchers is that genetic effects from ionizing radiation exposure are negligible. However, ongoing genetic research by Dr. Sadao Ichikawa at the Laboratory of Genetics of Saitama University in Japan has revealed significant intergenerational genetic defects caused by ionizing radiation to certain plants (liverwort). From plant models, Ichikawa extrapolates that genetic effects may be possible in humans exposed to radiation (Ichikawa, 1999).

Observations of Hiroshima and Nagasaki survivors do not support genetic effects to offspring in the first generation. Dr. Ichikawa's work suggests that the second generation and beyond may develop deleterious genetic defects as a result of radiation exposure. While there is no conclusive evidence of genetic damage from exposure to nuclear weapons among Japanese A-bomb survivors, these conclusions may not necessarily apply to the people in the Marshall Islands. While the A-bomb survivors were principally exposed to an acute or prompt external radiation, exposure of the Marshallese was exclusively associated with long-term exposure (internally and externally) from fallout. The Bravo test alone is the equivalent of 1,000 weapons the size of the bomb dropped on Hiroshima. The potential existence of genetic effects among the Marshall Islands population can only be demonstrated through monitoring generations of people exposed to ionizing radiation.

4.3 Disruption of Mental and Social Wellbeing as a consequence of the U.S. Nuclear Testing Program

4.3.1 Cultural Disruption

The Marshallese, like other indigenous Pacific Islanders, existed for centuries as a traditional, cohesive and self-sustaining culture. The people's livelihood, diet, social standing, family inheritance, position in the community, and culture was derived from their lineage land. Land was not a commodity that could be bought or sold but it was passed on traditionally and termed "life's blood."

Alienation from the land and critical natural resources through radioactive contamination or forced evacuation destroyed the physical and cultural means of sustaining and reproducing a self-sufficient way of life. It also destroyed community integrity, traditional health practices and sociopolitical relationships. Furthermore, community history and knowledge was destroyed as there was no lineage land from which to pass on knowledge about the local environment (Johnston and Barker 1999).

Bikinians, Rongelapese, and their descendents have had their culture, lifestyle, community and identity destroyed by the U.S. Nuclear Testing Program. These populations have been displaced to areas in the RMI where they have no land rights. The Rongelap community, once unified, had been dispersed between Majuro, Ebeye and Mejatto. The Bikinian Community is now divided between Ejit and Kili islands and other parts of Majuro. Ebeye and Majuro are overcrowded and people do not have access to the resources or land they need for survival. The Rongelapese and the Bikinians currently do not have the option of living on their home islands.

Of all the adverse effects of the U.S. Nuclear Testing Program, cultural destruction may very well represent the most significant long-term health implications. Bodily harm is a tragedy that affects an individual for a finite period of time, whereas cultural destruction adversely affects the health of entire communities for generations.

The U.S. Nuclear Testing Program deprived several Marshallese communities of their ability to live on their home islands, where all was familiar and known to them. In their forced diasporas, these communities are unable to provide for their basic needs or find comfort and meaning that comes from living on and surviving from their lineage land.

4.3.2 *Untoward Effects of Land Compensation*

The US model of land compensation assumes that land is owned or "belongs" to someone during a fixed period of time. This model assumes individual rights to property and does not take into account Marshallese customary law, land rights, and tenure systems.

Traditional land ownership involved a system where an *iroij, alap* and *rijerbal* all had an interest and prescribed rights in a given parcel of land. The iroij was the overseer and the person in charge of land, the *alap* was the manager of the activities taking place on the land, and the *rijerbal* were the people who performed the day-to-day work on the land. Each of them had a traditional responsibility to the other and a responsibility for the stewardship of the land. Through this interdependence the land was protected, farmed, and productive. Land was passed through a matrilineal system, defined the clan system, and was overseen by the men of the family.

Compensation of land loss with money is a Western paradigm that disrupts, minimizes and ignores the traditional cultural values and ownership of land. Placing a monetary value on land shifts the focus from matrilineal linkages to being bought, leased and sold by the men in the family. Land belongs to ancestors and future generations to ensure that the culture and tradition can be sustained indefinitely. Land does not belong to an individual.

In order to integrate two cultural systems of land valuation and ownership, there needs to be much forethought and planning involved in the compensation process. Appropriate compensation mechanisms requires a holistic approach of understanding human relationships, cultural and traditional values and meaning of land, and changing socioeconomic patterns. Without this holistic approach, more damage can be inflicted on the culture by inadequate or inappropriate compensation.

4.3.3 *Untoward Effects of Food Supplementation with Processed Western Foods*

Food supplementation became necessary for those who were displaced from their land and for those whose lands and food sources were contaminated with radiation. For many years, the U.S. Government has provided USDA foods, mostly white rice and other processed foods, to the people of the four atolls. Although some atoll communities are now using U.S. funding to purchase and ship their own foods rather than USDA foods, several adverse health impacts of USDA food supplements are evident in the recipient communities:

1. The natural diet was altered.
2. The Western diet that is available is high in fat, high in carbohydrates, low in fiber, and lacking Vitamin A and iron.
3. There was a loss of the cultural activities and norms surrounding food gathering and preparation.
4. The loss of the physical activities surrounding food preparation resulted in a more sedentary lifestyle.
5. Illnesses such as diabetes, atherosclerotic diseases, and hypertension were exacerbated by the Westernized diet and a more sedentary lifestyle.
6. The industriousness and work ethic needed to prepare local foods from coral atolls with few natural resources was stifled.
7. Dependency on food supplementation became a norm destroying the fabric of a once self-reliant community.

A practical approach toward adjusting to a Westernized diet is to educate and teach people about healthy choices while utilizing that diet and how to incorporate it into the traditional diet. The cultural framework of traditional food gathering and preparation, in conjunction with Western foods should be fostered and promoted rather than be replaced. The new DOE program has made an intensive effort to accomplish this end.

As a result of the Westernized diet, a diet that was first introduced to the Marshallese after the weapons testing, many health problems have evolved in the community. Children of the Marshall Islands have high rates of under nutrition (malnutrition, vitamin A deficiency, iron deficiency) (Palafox, UNICEF 1995). There are also very high rates of over nutrition in adults manifested as obesity and high rates of type II diabetes mellitus. The under nutrition in children and over nutrition in adults is associated with loss of a traditional diet, access to processed foods, adoption of a "Western" diet, and loss of cultural norms. The nutritional deficits are associated with the dietary and cultural changes that were initiated by the events of the U.S. Nuclear Testing Program.

5.0 THE HEALTH CONSEQUENCES OF THE U.S. NUCLEAR TESTING PROGRAM CONSTITUE A "CHANGED CIRCUMSTANCE."

5.1 <u>The Health Consequences of the U.S. Nuclear Testing Program have been discovered after the effective date of the 177 Agreement</u>

There were numerous direct and indirect health consequences of the U.S. Nuclear Testing Program that were discovered after the effective date of the 177 Agreement. These include:

a. the geographic distribution and doses of ionizing radiation creates a greater potential for radiogenic illness in the RMI
b. excessive rates of cancers in the RMI
c. significant rates of thyroid disease in the RMI.
d. adverse effects of food compensation programs
d. health burdens resulting from cultural disruption, destruction of lineage lands
e. health implications of the testing program on mental and social well being

These facts have been discovered after the date of the 177 Agreement and the Compact. Late discovery was exacerbated by a lack of medical monitoring systems, a lack of timely screening, and inadequate medical programs. This new information, understanding and knowledge about the health consequences of the U.S. Nuclear Testing Program represents a "changed circumstance".

5.2 <u>The Health Consequences could not have been reasonably identified as of the effective date of the 177 Agreement</u>

There was no baseline cancer or thyroid data gathered before or during the U.S. Nuclear Testing Program in the general Marshallese population, making before and after testing comparisons difficult. Many of the documents regarding levels of exposure and the geographic distribution of the fallout from the testing were not made available until after the effective date of the Agreement. A complete understanding about the health consequences of the U.S. Nuclear Testing Program was, therefore, not possible before the effective date of the 177 agreement.

The health consequences of the U.S Nuclear Testing Program described in section 5.0 could not have been reasonably identified as of the effective date of the 177 Agreement. The medical and epidemiological studies looking at the rates of thyroid and cancer in the RMI were completed years after the effective date of the agreement. Also the biopsychosocial model of health that links environmental, cultural, traditional, familial, emotional and mental stressors to health outcomes was not utilized to understand the health consequences until after the effective date of the Agreement. The vast majority of the anthropological data relating to changes in culture, communities, diets, and traditions as a result of the testing program was not gathered and analyzed until long after the 177 Agreement came into effect.

5.3 The Health Consequences render the provisions of the 177 Agreement manifestly inadequate

The health consequences of the U.S. Nuclear Testing Program are extensive and adversely affect the well being of individuals, communities, and generations in the Marshall Islands. The health consequences involve additional people, additional cancers, thyroid illness, cultural disruption, nutritional deficits, exacerbation of chronic illnesses, social disruption, and consumption of limited health resources of non-affected Marshallese. Because the 177 Agreement was not based on this greater understanding of the health consequences of the nuclear testing program, the resources and provisions of the 177 Agreement are manifestly inadequate.

The provisions of the 177 Agreement to care for the indirect and direct health consequences of the U.S. Nuclear Testing Program have always been inadequate. Moreover, the medical monitoring has been inadequate.

Because of the extent of health impact of the nuclear testing program and the inability of the 177 Agreement Medical provisions to effectively address the health issues, the 177 Agreement is manifestly inadequate.

6.0 RECOMMENDATIONS TO ADDRESS THE HEALTH CONSEQUENCES OF THE U.S. NUCLEAR TESTING PROGRAM

The health consequences of the U.S. Nuclear Testing Program are a result of radiological, cultural, social, environmental, nutritional, and physical insults and injuries to the peoples working and residing in the Marshall Islands during the testing era. The insults and injuries often resulted in health problems, including radiogenic illnesses, nutrition related illnesses, obesity, cardiovascular illness, and exacerbation of diabetic conditions. Medical, social, educational, and cultural programs must be included in the treatment and problem solving activities as part of a multidisciplinary, multi-sector approach to health care.

The U.S. Nuclear Testing Program caused exposures to high levels of ionizing radiation that carries an elevated risk for cancer to all people residing in the RMI. Additionally, particular medical conditions associated with lifestyle changes (diabetes, high blood pressure, heart disease) were exacerbated because the testing program forced a rapid, unwelcome, cultural, dietary, and environmental change in the affected people that resulted in illnesses, rapid cultural decay and community breakdown.

6.1 Structure and Design of Healthcare Delivery Programs

The medical programs should be equipped to address the protean manifestations of illness that were generated and perpetuated by the U.S. Nuclear Testing Program. Integration with the existing health system is essential for effective delivery of services. The medical programs should be structured to:

1. Deliver US standard primary, secondary and tertiary health care for the affected populations;
2. Fully integrate with the existing RMI health services *;
3. Have appropriate technological, health manpower, and financial support to ensure the viability of the system for the next 50 years;
4. Provide screening and treatment programs for radiogenic illness;
5. Promote self reliance and self-determination of individuals and communities served **.

*Integration allows the limited health finances to be utilized in a more cost-effective manner, and promotes a single administrative structure. The economy of scale will allow the health resources to extend further. Integration will actually allow target populations access to a more medically comprehensive, culturally competent, programmatically sound, and sustainable system from which to obtain health care.

**Health care delivery systems where the community takes responsibility for their own health and participates in sustaining that health system have been the most effective. The basic tenets of primary health care operate on the concept of maintaining personal and community responsibility for health.

6.2 Culture, Education, and Social Service Programs

Culture, education, and social service programs are necessary to address the effects of the U.S. Nuclear Testing Program discussed in section 4.0. Without the investment in these programs, many of the health consequences will be self-perpetuating. The types of programs required include:

1. Educational programs

a. Provided through and integrated into the public schooling system and as adult education programs;
b. Focused on helping communities and students understand the history of the U.S. Nuclear Testing Program and its multiple consequences;
c. Focused on health education particularly regarding nutrition, food preparation, healthy lifestyles, radiogenic illnesses, radiation, diabetes, community action, nuclear testing, and radiation exposure.

2. Cultural programs

a. Developed by and provided through the *Alele* Museum and public schools;
b. Focused on the history of each affected atoll, and the changes in leadership, kinship, lineage, land ownership, movement of peoples as a result of the U.S. Nuclear Testing Program;
c. Designed to emphasize traditional diets, agriculture, and fishing projects should be developed;
d. Designed and implemented with the input and involvement of representatives from populations exposed to radiation.

3. Social Service and Local Government Programs

a. Establishment of community action groups should be established to help implement the educational and cultural programs;
b. Working with local governments to identify culturally appropriate strategies to address the consequences of the U.S. Nuclear Testing Program in each locality.

6.3 Budgeting for Health Care Delivery Programs

A health finance expert/actuary would be the best person to determine costs of such programs.

As mentioned in section 4.1.2, the cost to deliver US level primary, secondary and tertiary care by applying US HCFA rates, would have an operational cost of (293x12, 259x12months) = $43,102,644 per annum. Travel and housing costs abroad would make the expenses considerably higher.

What kind of health care could 43 million dollars purchase in the RMI? As a rough estimate of costs, the following 1997 Per Capita Health Expenditure Data (from US IOM Report) should be considered.

Republic of Palau	$320
CNMI	$614
Guam	$510
American Samoa	$369
RMI	$128
177	$163

As a Pacific Island Nation and a US Commonwealth with a similar size population to the RMI, the CNMI provides a useful comparison. The annual operating budget of the CNMI with 58,000 people is close to 36 million dollars

The economy of scale rendered by building the health capacity of the RMI would have a tremendous advantage in the changed circumstance settlement. The upgraded health system would be able to accommodate the entire RMI population for nearly the same cost as purchasing healthcare for 12, 259 in the US. With the new information that demonstrates that thousands more people in the RMI were affected by ionizing radiation from the nuclear testing program than previously understood, this investment is sensible and essential.

An improved health care system should be funded for 50 years because the effects of the environmental, cultural, land tenure, dietary effects of the U.S. Nuclear Testing Program crosses generations. It has taken scientists and doctors 50 years to understand the nature and extent of the many problems caused by the testing program. It will take another well-planned 50 years to solve the intergenerational problems and illnesses caused by the U.S. Nuclear Testing Program.

6.4 Putting Health Care Financing into Perspective

The monies required to fund the RMI system for 50 years, 2.15 billion dollars, appears excessive. Comparing this cost to monetization of radiological health detriment lends perspective.

Through utilizing recently declassified information it has been determined by Dr. Hans Behling and Dr. John Mauro that the Rongelapese have been exposed to a total collective radiation dose of over 90,000 person rem effective dose equivalent (EDE) due to nuclear weapons testing. It is estimated that there will be 40 additional cancers that will occur in this Rongelap population from the external exposure alone.

Using standard methods employed by the US EPA and the Nuclear Regulatory Commission, a monetary amount can be assigned per statistical cancer fatality from that radiation exposure. The calculated cost of the associated potential health impacts for Rongelap is between 212.2 to 759.2 million dollars depending on the method of monetization employed. These figures represent only Rongelap exposure, and do not include the other atolls, and do not include monetization of health consequences of the U.S. Nuclear Testing Program beyond cancer.

6.5 Capitol Investment and Infrastructure

High quality health care can be achieved and sustained in the RMI if funded at the levels mentioned above. Tertiary care will still be required as an out of country referral. Notably, by establishing and maintaining an appropriate primary and secondary health system in the RMI, tertiary care will be held to a minimum and overall healthcare costs will be reduced.

Capitol expenditures include building new hospital facilities, and medical equipment in Majuro, Ebeye, and some of the outer island dispensaries. As mentioned above, this capitol cost would be about 50 million dollars.

Support for the health manpower and operation of a new health care program could be facilitated by assistance from the US Public Health Service (National Health Service Corps) physicians and from the University of Hawaii John A. Burns School of Medicine, which have both expressed interest and an ability to work in these areas. Other US Health agencies, such as the CDC, would be instrumental in establishing epidemiological and surveillance setup.

6.6 Medical Surveillance and Monitoring

Medical surveillance and health monitoring programs are essential to follow the health and environmental effects of the nuclear testing program. Monitoring the effects of efforts to attenuate contamination through cleanup programs is also important.

It is highly recommended that there be several medical and health monitoring programs for the entire population of the RMI. This would include establishing, maintaining and sustaining:

1. A national cancer registry;
2. A national thyroid registry;
3. A national birth outcomes registry;
4. Appropriate health screening examinations for all affected people for radiation related illness, including cancer and thyroid disease;
5. A national medical surveillance program for illnesses related to radiation exposure and associated environmental, social and economic changes associated with the testing program;

6. A national health database, medical records and health surveillance system;
7. Cancer and thyroid registries in the Pacific countries in close proximity to the RMI (Nauru, Kiribati, Kosrae, Pohnpei, Chuuk) should be established.

6.7 Conflict of Interest in Scientific and Medical Research

Our knowledge and understanding of the effects of radiation exposure on the human body are dependent on scientific and medical research. Much of the relevant research published and quoted is frequently conducted, supported, or funded by agencies/governments that are avid supporters of the use of nuclear power and nuclear weapons. In fact, a sizeable fraction of the scientific literature regarding the Hiroshima and Nagasaki victims and the Marshall Islands nuclear victims is supported by US agencies with pro-nuclear power and weapons interests. This may be regarded as a conflict of interest. The objectivity of such research and the resulting publications are, by association, suspect.

Scientific and medical objectivity must be accomplished through independent and objective scientific research. Funding should be administered through neutral agencies. There is no substitute for this type of information to establish credibility and trust in the communities being served.

7.0 HOW CAN THE HEALTH PROGRAMS BE HELD ACCOUNTABLE?

Accountability to the population being served and the US Congress are important issues to address. Accountability will be measured in terms of appropriate expenditure and utilization of monies/resources, and achieving specific outcomes for the mandated population.

The RMI Government is committed to ensuring accountability for health care delivery to the target populations. Assurances for credibility and success could be facilitated through the following:

1. A joint RMI/US oversight committee responsible for planning, implementing, monitoring and maintaining the health care programs for populations affected by the U.S. Nuclear Testing Program. The committee should include senior members of RMI Ministry of Health and Environment (MOHE), RMI Ministry of Foreign Affairs, RMI Ministry of Education (MOE), RMI Chief Secretary's Office, Nuclear Claims Tribunal, DOE, DOI, DOS and the USPHS.

2. Monies tied to radiation related programs should not be placed into the RMI general account. The account should be a separate account, tied to

implementation of programs related to the health consequences of the U.S. Nuclear Testing Program.

3. Hiring and firing of key personnel to be utilized in these programs should be done outside the RMI Public Service Commission.

4. Release of monies for the designated programs should be tied to performance measures.

5. The RMI will continue to appropriate an equal amount of money, with adjustments for inflation, to the Ministries of Health and Environment and the Ministry of Education during fiscal year 1998 and 1999.

6. The RMI commits itself to achieving a self-sustaining health care system by the year 2050, a system that will adequately monitor and care for the health of all individuals affected by the U.S. Nuclear Testing Program.

7. The RMI utilizes technical and health human resources from the US National Health Service Corps, US CDC and USPHS where appropriate.

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